Fermilab
FY2002 Self-assessment
Process Assessment Report
For
Technical Division

27-Sep-2002

Division/Section performing assessment

Technical Division

Name of organization that owns assessed process

Engineering & Fabrication and Material Control departments

Organization Strategy

Proper tooling is critical for fabricating the devices which support HEP. One of the core tasks of the Technical Division is the ongoing support of the Tevatron. This support includes the appropriate management of the tooling used to fabricate or repair devices used in the accelerator complex.

Names of Personnel on Assessment team

Jamie Blowers, Quality Assurance Officer

Name of process assessed

Management of accelerator component tooling

Brief description of process to be assessed

As stated above, part of the mission of the Technical Division is the support of the devices used in the accelerator complex. These devices are fabricated and/or repaired using specialized tooling. This means that the Division needs to ensure that appropriate tooling is available for the repair of accelerator devices, in the event that a need arises (e.g. there is a tunnel catastrophe and we need to fabricate new Tevatron dipoles). The process assessed is the management (i.e. handling and storage) of the tooling.

Are metrics associated with this process? If so, what are they?

There are no contractual or internal metrics associated with this process. Although it was not in the contract, there was a request from the DoE that the Laboratory plan to not renew the Aurora Warehouse lease when it came up in June 2002. As part of this request, Division management determined that we should have a goal of reducing tooling by as much as was practical (this turned out to be a 15% reduction).

What are the names of the procedures associated with this process?

There are no specific procedures associated with this process.

Are these procedures being followed? Are they current?

N/A.

Describe the methodology used to assess this process.

The methodology used to assess the process consisted of interviews with personnel involved in the process, and the review of databases and other records. Personnel from Material Control and Engineering & Fabrication Departments were interviewed (see attached notes for more details).

Results of the assessment:

The result of the assessment is that the tooling management process is given a rating of **good**. Overall the job is being done appropriately, and the deficiencies do not substantively affect performance. One of the positive highlights was the effort that went into the assessment of tooling storage needs, and the planning of the move and consolidation, paid off. Unnecessary tooling was scrapped, and so we were able to minimize the storage space required. The Aurora warehouse lease was not renewed, which will save the Laboratory $100k per year. The assessment of tooling (and general) storage needs spanned over a few years, and included the participation of the Technical Division, the Business Services Section, the Particle Physics Division and the Directorate. One notable practice was the high level of cooperation between all the participating organizations. Everyone involved worked towards the betterment of the Laboratory, not just his or her local organizations.

Another positive area is in the handling of lifting fixtures. A TD policy is published, and the database for lifting fixture is web-accessible. There is an engineer assigned to be responsible for the lifting fixture system, and personnel interviewed were aware of the system and its requirements.

The assessment showed that tools are managed on an as-needed basis. This strategy does get the job done, i.e. tooling is located when requested, and it is repaired when needed. Prior to the assessment, Division management had identified an opportunity for improvement in this area, and it is described in #4 in the next section.

The assessment also showed that each Department involved in tooling management currently has multiple database systems which are used. This is due to recent

improvements that are being implemented (e.g. both Departments involved have recently developed new databases which were put in place to improve the way they keep track of the tooling). In the short term this means there is redundancy in effort, but in the long term this should be an improvement for each Department. Regarding the databases, there is an opportunity for further improvement, which is described in #5 in the next section.

At the time of the assessment there was nothing written which described the overall methodology for managing tooling in the Division, with the exception of lifting fixtures. There are certain things which the Division is trying to do (e.g. all tooling which is moved in and out of Industrial Building 2 should be handled by the Tooling Group), but without these being documented, it is difficult to apply across the board.

Identified opportunities for improvement

The following were items for improvement:

1. Do not renew the Aurora Warehouse lease, saving $100k per year;
2. Evaluate the tooling inventory on the basis of need;
3. Reduce the tooling inventory by as much as is practical, by eliminating tools that are outdated and obsolete, thus creating room for new and future tooling;
4. Define and document an overall strategy and work process for managing tooling. This strategy should include preventive maintenance;
5. Work towards developing and implementing a system for managing the tooling which can be used by both Departments. This system would need to be developed to meet the needs of everyone involved, and so much planning needs to go into it.

Schedule for implementation of improvements

The first, second and third items above are already implemented (it is noted that the tooling reduction turned out to be 15%). The fourth and fifth items are goals which the Tooling Group Leader is going to accomplish this coming year.

Status of improvements from previous assessment

N/A

Attachments (supporting data, worksheets, reports, etc.)

The following attachments have been incorporated into this document:

"Audit notes" - Notes made as a result of the assessment

"TD Policy TD-4120" - TD policy on the review and acceptance of lifting devices

"Tooling Inventory List" - A printout of the current tooling database

"PW8 Proposal" - Selections from the proposal to cleanup and utilize PW8 as storage

"Audit records" - Various records collected during the assessment and report writing. These records pertain more towards the overall storage move, but include highlights from the tooling needs.

Notes from Accelerator Tooling Management assessment 27-Sep-2002:

Personnel interviewed during this assessment:

Gregg Kobliska, Material Control Department Head
John Zweibohmer, Material Control Department Deputy Head
Linda Alsip, Material Control Department Acquisitioner
Romesh Sood, Technical Division Associate Head
John Carson, Engineering & Fabrication Deputy Head
Luciano Elementi, Tooling Group Leader

Introduction:

This assessment was conducted by interviewing the personnel involved with tooling management, and the review of the various records and systems related to tooling management. The tooling for accelerator components is handled between the Material Control and the Engineering & Fabrication Departments.

Through the assessment it was learned that there are at least fours databases in place at this time, all of which are used to track tooling in some way (note: there is a fifth database, but it was only setup to demonstrate to the Tooling Group what could be done. This fifth system has not been in use for tooling). The four systems in use are:

1. Material Control Department Tooling Inventory Database (FileMaker Pro database, located at \\tdserver1\project\tooling\Tooling Inventory List.fp3);
2. Material Control Department Storage Database (located at http://tdserver1.fnal.gov/mcdstorage/);
3. Engineering & Fabrication Lifting Fixture Database (located at http://tdserver1.fnal.gov/lift/);
4. Engineering & Fabrication Tooling Inventory Database (located at \\tdserver1\TDWeb\eng\Tooling\MaintTooling11.mdb).

Specifics:

The first database listed above has been in use for many years. It is the central list used by Material Control for identifying tooling. It does have some updates which need to be made. These are updates from the recent review and scrapping of some of the tooling (related to the Aurora move). Updates of this nature are done as time allows.

The second database was recently developed, and its current scope is tooling stored in PW8. This database also has updates which need to be made. This database was developed to improve the way that Material Control is tracking tooling.

The third database (in its current form) is also relatively new, and its scope is limited to lifting fixtures. This database is currently under the direction of Tug Arkan, and it was recently migrated from a spreadsheet to the web-accessible database. There is a TD

policy regarding lifting fixtures (TD-4120 Review and Acceptance of Lifting Devices), and those involved in designing and handling lifting fixtures appear to be aware of the system, and who to contact regarding updating it. It was suggested that its control be moved to the Tooling Group (Luciano Elementi).

The fourth is also new, and does not appear to have been fully implemented. It was recently developed from within the Tooling Group, but the person who did the programming is no longer with the Laboratory. This database is capable of storing much information, but it is difficult to query the database to extract the information. It is also apparent that much of the records in the database are not being used (e.g. maintenance logs, parts lists).

Summary:

At this point, with the exception of lifting fixtures, tooling appears to be managed on an as-needed basis, which does get the job done. Everyone agreed that they would like to make things better and easier, and that converging into using one system should be looked into. Management already acknowledged that we should improve our methodology of how we manage our tooling day-to-day, and we should write this down somewhere so that we know what we decided.

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TD Policy 4120

TECHNICAL DIVISION

REVIEW AND ACCEPTANCE OF LIFTING DEVICES

Written by: _____ **Date:** _____
Richard Ruthe, TD SSO

Reviewed by: _____ **Date:** _____
Romesh Sood, TD Support Head

Approved: *Original signed by Peter Limon 08/09/00* **Date:** _____
Peter Limon, Division Head

1.0 PURPOSE AND SCOPE

The purpose of this policy is to ensure that all portable lifting devices and all below-the-hook lifting devices within the Technical Division are:

1) Reviewed and accepted for safe use by the designated engineer.
2) Used only if the rated capacity is clearly marked on them.
3) Listed on an inventory of accepted devices maintained by the designated engineer.

2.0 PROCEDURE

2.1 In accordance with FESHM 5022, the Technical Division has appointed a qualified person to review and maintain the documentation for all below-the-hook devices within control of the Division. (See Appendix A)

2.2 New below-the-hook devices cannot be used until the Technical Division designated engineer has accepted it as fulfilling the FESHM 5022 requirements.

2.3 The user of any existing below-the-hook device is responsible for ensuring that the fixture has been accepted for safe use by the Technical Division designated engineer and that it is listed on the below-the-hook inventory maintained by the designated engineer.

2.4 Any below-the-hook device that does not have an identifying number and rated capacity marked on it should be considered as not approved.

2.5 Through the issuance of this policy (TD-4120), the requirements described below will also apply to all portable lifting devices within the Technical Division:

1) A unique identifying number must be affixed to the portable lifting device.
2) The rated capacity of the portable lifting device must be either stenciled on the device or must appear on a plate affixed to the device.
3) A portable lifting device that is to be used must be listed on the lifting fixture inventory maintained by the designated engineer.
4) A portable lifting device must be inspected by the user before each use, looking for obvious signs of damage or flaws, which must be immediately reported to the designated engineer if found.
5) The Technical Division designated engineer must review and accept for use any portable lifting device that does not meet requirements #1, #2 and #3 listed above. A valid test lift or some other certification must be performed in the presence of the designated engineer, who will then record the information in the lifting fixture inventory if the device is deemed safe for use.

TD/Material Control
Tooling Inventory List
9/26/2002

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
AA	000107		DIPOLE COIL MOLD & 22' TABLE	00001				7/11/96
AA	000110		4' WINDING TABLE	00001				7/11/96
AA	000111		10' STACKING FIXTURE-HYDRAULIC	00001				7/11/96
AA	251		SQA,B,C,D,E 8 CURE FIXT 38 7/16					11/25/96
MC	185426		TABLES				SMQ	5/25/99
MD	351103		3Q60/120 POTTING & LEAD BEND TOOLING	00001	00000		MI3Q	3/8/2000
MD	14400	A	TRIM QUAD LAMINATION DIE	00001	00000		MATQ	2/26/2001
AA	000299		LEAD, WINDING	00002	01308			3/1/2000
AA	000300		FIX, LEADS FOR 8 DEG COILS (CRATE)	00001	01309			3/1/2000
MD	068005		DIE	00001	01347			3/8/2000
AA	000303		FIX, WIND MANDREL & CURING	00001	02082		I06	3/1/2000
MB	014153		PATTERN #0424	00001	05097		I42	3/1/2000
MD	042920		DIE - B1 WIDE GAP LAMINATIONS	00001	05434		MD-049290	7/11/96
ME	136101		DIE - LAMINATION	00001	05540		ME-136101	7/11/96
MD	016360		B-1 & B-2 STAMPING DIES	00001	05686		MD-016360	7/11/96
ME	116077		LARGE COIL WINDING FIXT. C-ABORT	00001	05687		ME-116077	7/11/96
MD	101079		DIE,F-21 UPPER MOLD LAM (DCL)	00001	05715		MD-101079	7/11/96
MD	023125	A	COIL LAM (LAMBERTSON), DIE	00001	05718		MD-023125A	
MD	023157		EXTRACTION MAGNETS C	00001	05719		MD-023157A	7/11/96
MC	023124	A	SEPTUM LAMINATIONS, DIE	00001	05720		I177	7/11/96
MD	124290		DIPOLE SLOTTED LAM. DIE	00001	05721		MD-124290	7/11/96
MB	101231		DIE-PANCAKE-FORMING KEY LAM. DCL	00001	05745		MB-101231	7/11/96
MC	101154		DIE-OUTER COIL MANDREL LAM. DCL	00001	05750		MC-101154	7/11/96
MA	100620		ALIGNMENT COMB. DIE	00001	05755		MA-100620	7/11/96
MB	101230		DIE-KEY SEAT LAMINATION (DCL)	00001	05756		MB-101230	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MC	101155		DIE-OUTER COIL MANDREL E/S	00001	05757		MC-101155	4/26/99
ME	101842		FIX,HYDRA.CLAMPING & PUMP-QUAD	00001	05762		QCM	7/11/96
MD	116383		CHEAP CHOKE STACKING FIXTURE	00001	05787			7/11/96
ME	116393		EXTRACT. LAMBERTSON ASSEMBLY	00001	05802		ME-116393	7/11/96
MD	116118		CURING, 3/8 SQ. COIL ASSEMBLY	00001	05804		MD-116118	7/11/96
MD	116397		WINDING FIXTURE LAMB. A & B	00001	05855			7/11/96
ME	116466		CURING FIXTURE LAMB. A & B	00001	05855			7/11/96
MA	125610		BLANKING DIE QCM	00001	05879		MA-125610	7/11/96
ME	116419		COIL WINDING FIXTURE (T-203)	00001	05880		ME-116419	7/11/96
MC	124763	A	QUAD NOTCHED LAM. DIE	00001	05898		MC-124763	5/28/99
MC	124764		QUAD SLOTTED LAM. DIE	00001	05899		MC-124764	7/11/96
MB	103023		DIE,SHIELD FLANGE DCR	00003	05926		MB-103023	7/11/96
MD	043421	A	DIE, LAMS, TOP & BOTTOM	00001	06023		LAMB	3/1/2000
MC	043422	C	DIE, LAMINATION-CENTER	00001	06024		LAMB	3/1/2000
MD	101098		FIX,CHEAP CHOKE WINDING FIXTURE	00001	06033		MD-101098	7/11/96
MA	101358		DIE, OUTER SEG. LBQ LAMINATION	00001	06067		MA-101358	7/11/96
MA	101366		DIE,OUTER KEY LBQ LAMINATION	00001	06068		MA-101366	7/11/96
MC	101368		LAMINATION DIE MANDREL - LBQ	00001	06069		MC-101368	7/11/96
MD	101370		DIE, INNER COIL LBQ LAMINATION	00001	06070		MD-101370	7/11/96
MB	101394		DIE,TRIM MAND LBQ LAMINATION	00001	06071		MB-101394	7/11/96
MD	101369		DIE, 2 PC. OUTER COIL LBQ LAM	00001	06072		MD-101369	7/11/96
MC	176912		BACK-UP BAR CENTER LAM. T-223	00001	06122		MC-176912	7/11/96
MD	014527		PATTERN, PLATE	00001	06148		MRQ	3/1/2000
ME	160079		QUAD ALIGNMENT FIXTURE .1/2	00001	06161			7/11/96
ME	160112		QUAD ALIGNMENT FIXTURE .1/2	00001	06161			7/11/96
ME	160042		QUAD ALIGNMENT FIXTURE .2/2	00001	06162			7/11/96
MD	124289	C	DIE-NOTCHED LAMINATION	00001	06165		MD-124289C	7/11/96
MD	024308	A	DIE-LAMINATION LAMBERTSON MAGNET	00001	06342		MD-024308A	7/11/96
AA	000104		8 GEV CURING FIXTURE (LACKEY FIXT.)	00001	06354			7/11/96
MB	116605		BARS - SIZING (ALUMINUM)	00001	06369		MB-116605	7/11/96
ME	116692		FIXTURE-WINDING 4Q120 (INNER COIL)	00001	06371		ME-116692	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MB	176465		POLE TIP SPACER LAM.	00001	06408		MB-176465	7/11/96
MD	043457		FIXTURE-STACKING-3 WAY LAMBERTSON	00004	06451		T-223	7/11/96
MB	176424		RODS-ALIGNMENT 3/16" DIA.	00002	06452		MB-176424	7/11/96
ME	116746		FIXT. CURING INNER COIL	00002	06453		ME-116746	7/11/96
ME	116773		FIXT. CURING OUTER COIL (T-223)	00001	06454		ME-116773	7/11/96
MD	185405		FIXTURE - STRAIGHTENING (T-223)	00001	06455		MD-185405	7/11/96
ME	185279		WELDM.-MOUNTING BASE (INCOMP.)	00004	06477		ME-185279	7/11/96
ME	176561		MID-SECTION (REF. ME-176555)	00001	06478		ME-176561	7/11/96
ME	176546		MID-SECTION (REF. ME-176539)	00001	06479		ME-176546	7/11/96
MD	001233		DIE, LAMINATION B-2	00001	06515		B-2	7/11/96
ME	176830		FIXT.-TURNOVER (4' X 4' X 6') SMQ	00001	06528		ME-176830	7/11/96
ME	116128		EXTRA-MLD. & PAT. FOR POT COVERS	00001	06596		ME-116128	7/11/96
ME	116391		EXTRA-MLD. & PAT. FOR POT. COVERS	00001	06596		ME-116391	7/11/96
ME	185365		WELDMENTS - END SECTION	00004	06743		ME-185365	7/11/96
ME	185205		FIXTURE-WIND. 8 TURN (INVERTED)	00001	06756		ME-185205	7/11/96
MA	126089	A	DIE-CENTER ANCHOR COLLAR TRIM	00001	06788		MA-126089A	7/11/96
MC	097737	C	DIE-STAMPING LAMINATION-QUAD	00001	06800		MC-097737C	7/11/96
ME	185347		WINDING & CURING FIXTURE	00001	06801		ME-185347	7/11/96
ME	185218	D	FIXT.-3 & 4 COIL WINDING-TEV I SQ	00001	06830		ME-185218D	7/11/96
ME	185251		FIXT.-5 & 6 COIL WINDING- TEV I SQ	00001	06831		ME-185251	7/11/96
MC	124125	E	DIE FOR GROUND WRAP INSULATION	00001	06875		MC-124125E	7/11/96
MC	125515		DIE FOR CONDUCTOR STRAIN RELIEF	00001	06914		MC-125515	7/11/96
MB	103593		DIE-COMPOUND STAMPING-QCL	00001	06927		QCL	7/11/96
MD	001233		DIE, B-2 LAMINATION	00001	07008		MD-001233	7/11/96
ME	185324	B	FIXT. - 7 TURN COIL WINDING (26.18)	00001	07016		ME-185324B	7/11/96
MC	124126		DIE-BRAKE PRESS COIL ARM	00001	07056		MC-124126	7/11/96
ME	116853		B-1 RETURN END MOLD	00001	07057		ME-116853	7/11/96
ME	116854		B-1 LEAD END MOLD	00001	07057		ME-116854	7/11/96
ME	185948		FIXTURE - CURING 60" DIPOLE	00002	07146		ME-185948	7/11/96
ME	185923		FIXTURE - COIL WINDING (T-268)	00001	07160		ME-185923	7/11/96
MC	185973		SPLICING TOOLS	00002	07160		MC-185973	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MC	185974		FIXTURES-CONDUCTOR BRAZING	00002	07160		MC-185974	7/11/96
MB	103735		DIE-DIPOLE COLLAR MODIFIED L.H.	00001	07179		DCL	7/11/96
MB	103736		DIE-DIPOLE COLLAR-MODIFIED R.H.	00001	07180		DCL	7/11/96
ME	185898		FIXTURE - PLATE	00001	07191		ME-185898	7/11/96
MC	198138		SPACER	00001	07191		ME-198138	7/11/96
MC	198161		SPACER	00001	07191		ME-198138	7/11/96
ME	027752	A	DIE - COMPOUND STAMPING/6-3-120	00001	07196		ME-027752A	7/11/96
ME	185525		FIXTURE - WINDING 7 TURN (SQD)	00001	07229		ME-185525	7/11/96
ME	185532	B	FIXTURE - 8 COIL WINDING (SQD)	00001	07233		ME-185532	7/11/96
ME	185732		UPPER SADDLE COIL ASSY FIXT	00001	07283		SMD	3/8/2000
ME	020227		DIE, SEPTUM PULSE LAMINATION	00001	07331		ME-020227	7/11/96
ME	185895		MAIN CLAMP SECTION	00001	07355		ME-185616	7/11/96
ME	185896		MAIN CLAMP SECTION	00001	07355		ME-185616	7/11/96
MB	001808	B	PATTERN & CORE BOX-MANIFOLD CASTING	00001	07356		B1 & B2	7/11/96
ME	185584		LQD 2 & 3 TURN WINDING FIXTURE	00001	07405		ME-185584	6/1/99
ME	185585		LQD 4 & 5 TURN WINDING FIXTURE	00001	07406		ME-185585	6/1/99
ME	185586		LQD 7 TURN WINDING FIXTURE	00001	07407		ME-185586	7/11/96
ME	185582		LQE 4 & 5 TURN WINDER (DIS. ASSM.)	00001	07409		ME-185582	7/11/96
ME	185583		LQE 7 TURN WINDER (DIS. ASSM.)	00001	07409		ME-185583	7/11/96
ME	185581		LQE 2 & 3 TURN WINDER (DIS. ASSM.)	00001	07410		ME-185581	7/11/96
ME	185575		LQB 2 & 3 TURN WINDING FIXTURE	00001	07411		ME-185575	7/11/96
ME	185576		LQB 4 & 5 TURN WINDING FIXTURE	00001	07412		ME-185576	7/11/96
ME	185577		LQB 7 TURN WINDING FIXTURE	00001	07413		ME-185577	7/11/96
ME	185567		FIXTURE - 8 COIL WINDING SQB	00001	07495			7/11/96
ME	185565		FIXTURE - 5 & 6 COIL WINDING (SQB)	00001	07502		ME-185565	7/11/96
ME	185565		FIXTURE - 5 & 6 COIL WINDING (SQB)	00001	07504		ME-185565	
ME	185518	D	FIXTURE - 5 & 6 COIL WINDING SQD	00001	07508			7/11/96
ME	185511		FIXTURE - 3 & 4 COIL WINDING SQD	00001	07509			7/11/96
ME	196838	A	DIE-LAMINATION A.D. TRIM DIPOLE	00001	07599		ME-196838	7/11/96
ME	196839	A	DIE-DEBUNCHER RING TRIM DIPOLE	00001	07622		ME-196839A	7/11/96
ME	185572		FIXTURE - WINDING - LQA 2 & 3 TURN	00001	07632		ME-185572	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	027385	G	DIE - LAMINATION 4Q120	00001	07636		ME-027385G	7/11/96
MB	197177		DIE-LAMINATION, POLE TIP SPACER	00001	07638		MB-197177	7/11/96
ME	185556	A	FIXTURE - WINDING SDC PANCAKE	00001	07641		ME-185556A	7/11/96
MD	016360		DIE B-2 END CAN PIERCING	00001	07681		MD-016360	7/11/96
MD	176018		DIE-SMALL APERTURE QUAD LAM.	00001	07692		MD-176018	7/11/96
MD	002126	F	DIE LAMINATION - BOOSTER D MAGNET	00001	07703		MD-002126F	7/11/96
MD	002127	F	DIE LAMINATION - BOOSTER D MAGNET	00001	07703		MD-002127F	7/11/96
MD	000839	B	DIE LAMINATION - B-2 MAGNET	00001	07704		B-2	7/11/96
MD	023158		DIE LAMINATION - CONV. H. MAGNET	00001	07706		MD-023158	7/11/96
MB	192730		DIE - BLANKING	00001	07715		MB-192730	7/11/96
MD	115536	B	DIE-LAMINATION TRIM	00001	07775		MD-115514	7/11/96
AA	000016		CLAMP&STACK FIX-1/2 CORES E/S	00001	07781	28435		7/11/96
MB	014151	C	PATTERN-PLATE FOR MANIFOLD CASTING	00001	07815		0	7/11/96
MB	014152	B	PATTERN-PLATE FOR MANIFOLD CASTING	00001	07816		0	7/11/96
ME	186682		FIXTURE-WINDING/I #33/16 TURN CHOKE	00002	07852		ME-186682	6/1/99
MD	198912		FIXTURE-ASS'Y-WINDING (I #3 SEXT.)	00002	07860		MD-198912	7/11/96
MD	077723		FIX., LAMINATION CHECKING	00001	07912			3/8/2000
MD	197917		FIXTURE-SMALL SEXTUPOLE CUR. (I #3)	00006	07972		MD-197917	7/11/96
ME	116128	E	PATTERN & MOLD-LEAD END POT. COVER	00001	08031		ME-116128E	7/11/96
ME	116391	E	PATTERN & MOLD-RETURN END POT COVER	00001	08031		ME-116391E	7/11/96
ME	198479		CLAMPING FIXTURE-SMD (EXTRA PARTS)	00001	08062		ME-198479	7/11/96
MD	185416		WELDMENT 2 1/2" (SMD) (SET)	00001	08066		MD-185416	7/11/96
MD	185412		WELDMENT 7 1/2 DEG. (LGD) (SET)	00001	08069		MD-185412	7/11/96
MD	185415		WELDMENT 5 DEG. SMALL DIPOLE (SET)	00001	08075		MD-185415	7/11/96
ME	185478		FIXTURE-CURING SADDLE COIL - LDA	00001	08116		ME-185478	7/11/96
ME	198357		SMD CHECKING SADDLE ENDS	00001	08214			7/11/96
ME	198463		FOOT LOCATING SDB	00002	08215			7/11/96
ME	198462		FOOT LOCATING SDA	00002	08216			7/11/96
MB	185979		DIE-TRIM DIPOLE BENDING (T-268)	00001	08374		MB-185979	7/11/96
MB	185980		DIE-TRIM DIPOLE BENDING (T-268)	00001	08374		MB-185980	7/11/96
MD	001232		LAM DIE	00001	08385		B-1	3/1/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	210007		DR & REAM FIXT	00001	08394		LGD	3/8/2000
ME	198460		FOOT LOC FIXT (D) (SET)	00001	08411		SMD	3/8/2000
ME	198461		FOOT LOC FIXT (E) (SET)	00001	08412		SMD	3/8/2000
ME	186889		FIX., CUTTING OIL	00001	08413		T202	3/8/2000
ME	198862		HOLD DOWN FIXT (LOT)	00001	08457		LGD	3/8/2000
MD	198849		FIXTURE-SIDE PLATE WELDING SMD	00010	08460		MD-198849	7/11/96
MD	119142		DIE, LAMINATION REV. INJ. (F-17)	00001	08579		I95	3/8/2000
MD	119144		DIE, LAMINATION REV. INJ. (F-17)	00001	08579		I95	3/8/2000
MD	119221		DIE, LAMINATION	00001	08580		I95	3/8/2000
ME	198832		F17 C MAGNET WINDING FIXT	00001	08582		FMIC	3/8/2000
ME	210004		F17 C MAGNET CURING FIXTURE	00001	08582		FMIC	3/8/2000
MC	186677		STACK FIXT	00001	08584		T33	3/8/2000
MD	176022		ALPHA DIE-LAMS. (COMPOUND STAMPING)	00001	08608		MD-176022	7/11/96
MD	176022		ODM DIE-SMALL DIPOLES LAMS.	00001	08625		MD-176022	7/11/96
ME	176024		DIE-STAMPING LONG DIPOLE LAM.	00001	08626		ME-176024	7/11/96
ME	198813		FIXTURE - CURING 80" LAMB. (I05)	00001	08847		ME-198813	7/11/96
MD	198473		CENTER ARBOR/SDD SADDLE CURING FIXT	00001	08919		MD-198473	7/11/96
ME	198926		COIL CURING FIXTURE (ITEM #2)	00003	09001		ME-198926	7/11/96
ME	198906		COIL WINDING FIXTURE (ITEM #2)	00003	09002		ME-198906	7/11/96
ME	043349		LAM DIE	00001	09018		B-1	3/1/2000
ME	198932		COIL CURING FIXT. (ITEMS #1 & #65)	00002	09068		ME-198932	7/11/96
ME	198900		COIL WINDING FIXT. (ITEMS #1 & #65)	00002	09069		ME-198900	7/11/96
MD	101078		DIE-COIL MANDREL E/S INNER	00001	09203		MD-101078	4/26/99
ME	185607		FIXTURE - CURING 4 & 5 TURN LQD	00001	09239		ME-185607	7/11/96
ME	185562	B	FIXTURE-WINDING SQA 7 TURN COIL	00001	09300		ME-185562B	7/11/96
ME	185602		FIXTURE - CURING SQA 8 TURN	00001	09301		ME-185602	7/11/96
ME	185560	A	FIXTURE-WINDING SQA 3 & 4 TURN	00001	09302		ME-185560A	7/11/96
ME	185561		FIXTURE-WINDING SQA 5 & 6 TURN	00001	09303		ME-185561	7/11/96
ME	210209		FIXTURE - WINDING LQA 4 TURN	00001	09305		ME-210209	7/11/96
ME	185563		FIXTURE - WINDING SQA 8 TURN	00001	09306		ME-185563	7/11/96
ME	185600		FIXTURES - CURING SQA 5 & 6 TURN	00002	09329		ME-185600	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	185602		FIXTURE - CURING SQA 8 TURN	00001	09330		ME-185602	7/11/96
ME	185601		FIXTURES - CURING SQA 7 TURN	00002	09331		ME-185601	7/11/96
AA	000132		FIXT.-CURING ESPS FILTER CHOKE/I38	00001	09356			7/11/96
ME	210218		FIXTURE - CURING LQA	00001	09357		ME-210218	7/11/96
ME	185599		FIXTURES - CURING SQA 3 & 4 TURN	00002	09368		ME-185599	7/11/96
MD	185140	A	COIL CLAMPS 3 & 4	00024	09379		MD-185140A	7/11/96
MD	185145	A	COIL CLAMPS 5 & 6	00024	09379		MD-185145A	7/11/96
MD	185148	A	COIL CLAMPS 7 TURN	00024	09379		MD-185148A	7/11/96
MD	185153	A	COIL CLAMPS 8 TURN	00024	09379		MD-185153A	7/11/96
MD	185951		TEV I, SMQ STANDS	00013	09523		1 CRATE	7/11/96
MA	176053		HOLD DOWN BARS	00036	09530		SMQ	7/11/96
MC	186882		FIXTURE-FOOT LOCATING TEV. I	00001	09531		ITEM #3	7/11/96
ME	210112		FIXTURE - FOOT LOCATING	00001	09531		I #1 & 2	7/11/96
ME	176823		PLATE - PUSHER - LARGE QUAD	00001	09532		TEV 1	7/11/96
MD	185450		FIXTURE - HOLD DOWN	00012	09554			7/11/96
MB	185451		PLATES - SPACER	00012	09554			7/11/96
MB	186630		DIE, LAMINATION-BUMP MAGNET	00001	09568		2" GAP	7/11/96
AA	000185		PLATES-SMQ CURING, 2 LG. & 3 W/BOLT	00005	09604		COSMOLINE	12/3/99
ME	185071	B	PLATES - SMQ STACKING & CURING	00013	09605		2 CRATES	7/11/96
ME	198683		FIXTURE-COIL CURING F-17 LAMBERTSON	00001	09623		CENT. SEC.	7/11/96
AA	000177		WELD POSITIONER	00001	09635			1/19/2000
ME	225302		FIXTURE - WINDING & CURING	00001	09667		ITEM #69	7/11/96
ME	225260		PLATES - WINDING & CURING	00006	09705		ITEM #71	7/11/96
MD	196216		DIE - FORMING TOOL	00001	09722		TEV I	7/11/96
ME	116154	D	MOLD & PATTERN B-1 RETURN END	00001	09723		(SET)	7/11/96
ME	116155	E	MOLD & PATTERN B-1 LEAD END	00001	09723		(SET)	7/11/96
AA	000320		ASSEMBLY TABLE 24 FT LG	00001	09852		LHC, SSC, TEV	3/1/2000
AA	000191		MISC PARTS WINDING FIXT LDG&SMD	00001	09889		4 PCS.	7/11/96
MC	176582		LIFT PLATE (LD & SMD COIL)	00001	09889		MD-176652	7/11/96
MB	176583		CYLINDER PLATE (LD & SMD COIL)	00001	09889		MD-176652	7/11/96
MB	176584		BRACKET (LD & SMD COIL)	00001	09889		MD-176652	7/11/96

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MB	198123		CYLINDER MTG. PLATE FOR DIPOLE FIXT	00001	09889			7/11/96
MD	198136	A	DIE SHOE (LEAD END) LD WINDING FIXT	00001	09889		MD-185671	7/11/96
MC	198137	A	UPPER LEVEL SHOE FOR LD WIND. FIXT.	00001	09889		MC-185671	7/11/96
MD	198160	A	DIE SHOE (IDLE END) LD WINDING FIXT	00001	09889		MD-185672	7/11/96
ME	119191		DIE, LAMINATION OUTER	00001	09933		I94	3/8/2000
ME	119191		F17 LAMINATION,OUTER CORE DIE	00001	09933		FMIC, I94, I95	3/8/2000
AA	000182		TESLA MOLD, ALUM # 6 TOP	00001	10001		PW8 (for I139)	3/6/2002
AA	000183		TESLA MOLD #5 UPPER C COIL	00001	10002		PW8 (for I139)	3/6/2002
AA	000348		MOLD, ALUM. UPPER"A" COIL, #7 BOTTOM	00001	10003		PW8 (for I139)	3/6/2002
ME	198724		FIXTURE - SDE SADDLE ASSEMBLY	00001	10004		PW8 (for SDE)	3/6/2002
ME	198555		SDB SADDLE COIL CURING FIXTURE	00001	10005		PW8 (for SDB)	3/6/2002
ME	198014		FIXTURE, SDB & SDE CURING PANCAKE	00001	10006		PW8 (for SDB)	3/6/2002
ME	198651		COIL CURING FIXTURE	00001	10007		PW8 (for I94, I95)	3/6/2002
ME	198468		CURING FIXTURE SDD SADDLE COIL TEV1	00001	10008		PW8 (for SDD)	3/6/2002
ME	198700		FIXTURE-SDE SADDLE, CURING	00001	10009		PW8 (for SDE)	3/6/2002
ME	115466		3Q60/120 QUAD STACK & ASSY FIXT	00001	10010		PW8 (for MI3Q)	3/6/2002
ME	225121		Spoiler Coil Winding & Curing Fixture I#40	00001	10011		PW8 (for SD3-SD4-SD5)	3/6/2002
AA	000248		20’ WINDING BLOCK	00001	10012		PW8 (for I139)	3/6/2002
AA	000017		FIXTURE, MAIN INJECTOR TOOLING	00001	10013		PW8/ MAIN INJECTOR	3/22/2002
ME	115479		3Q60/120 BUSS ASSY FIX & BRKT SPRDR	00001	10014		PW8 (for MI3Q)	3/6/2002
AA	000181		EVERSON SHORT WIND-SAGITTA GAGE	00001	10015		PW8 (for I139)	3/6/2002
AA	000247		13’ WINDING BLOCK	00001	10016		PW8 (for I139)	3/6/2002
ME	338088		TABLE, ASSEM PERM MAGNET	00001	10017		PW8 (for RGD, RDSM)	3/6/2002
ME	338296		PLATE, SIDE PUSHER - 10'	00002	10017		PW8 (for SGD, SGF)	3/6/2002
MD	338100		PLATE, SIDE PUSHER - 12 FT	00002	10017		PW8 (for RGD, RGF)	3/6/2002
AA	000332		FIXTURE, 4 FT QUADRUPOLE TUBE	00001	10017		PW8 (for R20Q)	3/6/2002
AA	000250		UPPER LEAD BENDER, LARGER STAND	00001	10018		PW8 (for I139)	3/6/2002
ME	198499		Fixture SDB Saddle Assy TEV1 Small Dipole	00001	10019		PW8 (for SDB)	3/6/2002
AA	000033		4Q120 HALF MAGNET ASSY	00001	10020		PW8 (for 4Q120/T-212	3/6/2002
AA	000034		HYDRAULIC TABLE	00001	10021		PW8	3/6/2002
AA	000315		C MAGNET COIL WINDING MANDREL	00001	10022		PW8 (for FMI C-MAGNET)	3/6/2002

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ME	198437	1	CURING FIXT.-SDC PANCAKE ASS'Y SMD	00001	10033		PW8/AURORA/OLD SMR 08018	8/20/2002
ME	198521		FIXTURE-CURING - SDC SADDLE COIL	00001	10038		PW8/AURORA/OLD SMR 08080	8/20/2002
ME	198851		CURING FIXT.-PANCAKE COIL (SMD,SDA)	00001	10046		PW8/AURORA/OLD SMR 08065	8/20/2002
ME	331482		FIX., COIL CURING & POTTING	00001	10047		PW8/AURORA/OLD SMR 90117	8/20/2002
MD	227375	F	MOLD RETAINER 12" L.E.	00004	10051		LBQ 716 - PW8	5/22/2002
ME	115534		POTTING FIXTURE BUMP MAGNET	00001	10054		PW8/AURORA/OLD SMR12570	8/20/2002
ME	274088		BRAZING FIXTURE FMI DIPOLE	00002	10060		PW8/AURORA/OLDSMR#90068	5/24/2002
AA	000045		ENERGY SAVER TOOLING	00001	10061		PW8/PART OF MD 160439	3/26/2002
AA	000203		E/S TOOLING BOX 4	00001	10062		PW8/AUR?SMR# 11034,See P/L	5/24/2002
MD	160439	A	TOOLING, MAND. COIL RETAINER - OUTER	00001	10062		PW8/ E/S & LBQ/Old SMR11331	5/24/2002
AA	000204		E/S TOOLING BOX 3	00001	10063		PW8/AUR/SMR# 11035,SeeP/L	5/24/2002
AA	000046		ENGERY SAVER DIPOLE TOOLING	00001	10063		PW8/ PART OF MD160439	3/26/2002
ME	116693		FIXT.-4Q120 COIL WIND./ INNERCOIL	00001	10064		PW8/ AURORA/OLD SMR#08108	5/24/2002
ME	116289		SIZING BARS, 4Q120,	00004	10065		PW8/ AURORA/OLD SMR0811	5/24/2002
ME	116306		SIZING BARS, 4Q120	00004	10065		PW8/AURORA/OLD SMR#08111	5/24/2002
ME	116307		SIZING BARS, 4Q120	00004	10065		PW8/AURORA/OLDSMR# 08111	5/24/2002
ME	116308		SIZING BARS, 4Q120	00004	10065		PW8/AURORA/OLDSMR# 08111	5/24/2002
ME	116309		SIZING BARS, 4Q120	00004	10065		PW8/AURORA/OLD SMR#08111	5/24/2002
ME	116710		4Q120 MAGNET CURING FIXTURE	00001	10065		PW8/4Q120/OLD SMR# 08111	3/22/2002
ME	116292		SIZING BARS, 4Q120	4	10065		PW8/AURORA/OLD SMR# 8111	5/24/2002
ME	116659		FIXT.-4Q120 WINDING OUTERCOIL	00001	10066		PW8/AURORA/OLDSMR# 08107	5/24/2002
ME	116667		FIX, WIND.4Q120 LEFT HAND END DIE	1	10066		PW8/AURORA/OLD SMR#8110	5/24/2002
ME	024304		MOLDS-POTTING,FOR BUMP MAGNETS	00001	10067		PW8/AURORAOLD SMR#10786	5/24/2002
MD	116208		FIX, WINDING & CURE, INNER COIL 6"SYM	00001	10068		PW8/AURORAOLDSMR90020	5/24/2002
AA	000070		SLINGS, SCHACKLES,CABLE	00001	10069		PW /SMD&LGD/OLD SMR90073	3/26/2002
AA	000048		CABLE,SLINGS/SCHACKLES FOR DIPOLE	00001	10069		SMD & LGD PW8	5/22/2002
MD	274259		CROSSBEAM, MRI ASSY	00001	10070		PW8/AURORA/OLD SMR13389	5/24/2002
ME	116084		FIX, CURE OUTER 6" SYM LAMBERTSON	00001	10071		PW8/ AURORA/ OLD SMR90039	5/24/2002
ME	274200		FIXTURE, LIFT, HOOKED LEADS #40	00001	10072		PW8/AURORA/MIR/TLF#1040	5/24/2002
AA	000018		FIXTURE, WELDING B.T. P/O FMI QUAD	00001	10076		PW8/AURORA/OLD SMR90160	5/31/2002
ME	115547		RAILS, STACKING BUMP MAGNETS	00001	10078		PW8/AURORA/OLD SMR13054	5/31/2002

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MD	210058		BUMP STACKING RAILS	00001	10078		PW8/AURORA/OLD SMR 13054	8/20/2002
ME	198437		CURING FIXT.-PANCAKE ASS'Y (SDD,SMD	00001	10079		PW8/AURORA/OLD SMR 08016	8/20/2002
ME	198437		CURING FIXT.-PANCAKE ASS'Y (SDD,SMD	00001	10080		PW8/AURORA/OLD SMR 08016	8/20/2002
ME	331467		MI LAMB STACK. PLATE & HOLD DOWNS	00001	10081		PW8/AURORA/MI LAMB.	5/22/2002
ME	176914		FIX, POTTING 3 WAY LAMBERTSON	00001	10083		PW8/AURORA/OLD SMR 90022	8/20/2002
ME	198437		CURING FIXTURE-PANCAKE (EXTRA PARTS	00001	10089		PW8/AURORA/OLD SMR 08062	8/20/2002
ME	196494		COIL, UPPER PANCAKE-SDE	00001	10094		PW8/AURORA/OLD SMR 12373	8/20/2002
AA	000005		LG. QUAD CURING FIXTURE PARTS/ASS'Y	00001	10104			7/11/96
ME	225399	B	FIXT.-LIFTING SANDBLASTING COIL/A	00001	10112		I #52 & 53	7/11/96
ME	116316		FIXTURE-STACKING (RAILS) B-2	00001	10125		Old SMR# 10787 - PW8	5/22/2002
ME	116398		FIXTURE, CURING EXTR. LAMBERTSON	00001	10127		PW8/AURORA/OLD SMR 13251	5/31/2002
ME	116449		FIXTURE, CURING EXTR. LAMBERTSON	00001	10127		PW8/AURORA/OLD SMR 13251	5/31/2002
ME	116449		FIXTURE, COIL BRAZING EXTR LAMB.	00001	10127		PW8/AURORA/OLD SMR 13251	5/31/2002
ME	210179		FIXTURE - WINDING & CURING S-1	00001	10128		PW8/AURORA/OLD SMR 08910	8/20/2002
ME	186805		FIXTURE-CURING 9' SWEEPING (I #27)	00001	10129		PW8/AURORA/OLD SMR 08375	8/20/2002
ME	198489		MOLD-CURING, SDD SADDLE COILS	00001	10130		PW8/AURORA/OLD SMR 10582	8/20/2002
AA	000040		TABLE-SAGITTA SMD BENDING MAG. COIL	00001	10131		PW8/AURORA/OLD SMR 08135	8/20/2002
ME	271620		TOOLING, 50MM Y&S 1-21' BOTTOM PC	00001	10132		PW8/AURORA/OLDSMR#90121	5/31/2002
ME	318214		WELDING,TABLE ASSY,160"&240" ASSY#2	00001	10133		PW8/AURORA/OLD SMR#90123	5/24/2002
ME	225691	A1	FIX, POTTING COVER CLAMPING B1& B2	00001	10136		PW8/AURORA/OLDSMR# 90097	5/24/2002
ME	185553	A	FIXTURE, WINDING LG DIPOLE	00001	10139		PW8/AURORA/OLD SMR 8195	5/31/2002
ME	185554		SDA PANCAKE WINDING FIXTURE	00001	10140		PW8/AURORA/OLD SMR 08148	8/20/2002
ME	198484		FIXTURE-LDA/SDA SADDLE COIL ASS'Y	00001	10141		PW8/AURORA/OLD SMR 08147	8/20/2002
ME	116877		TOOLING, R.E. CLAMP - MOD B-1	00001	10143		PW8/AURORA/OLD SMR 6352	5/31/2002
ME	116930		TOOLING, L.E. CLAMP - MOD B-1	00001	10143		PW8/AURORA/OLD SMR 6352	5/31/2002
ME	198874		CYLINDERS, HYDRALIC & RAILS	00001	10144		PW8/AURORA/OLD SMR 12375	8/20/2002
AA	000072		STAND, TEST TABLE FROM IB1	00001	10145		PW8/AURORA/E&F MAGNET	5/22/2002
AA	000073		MOTOR, ELECTRIC FOR STACKING TABLE	00001	10146		PW8/AURORA	5/22/2002
MD	331500		FIX.,WIND & CURE - HORIZONTAL	00001	10150		PW8/AURORA/ MI TRIM DIPOLE	5/22/2002
MD	331519		FIX.,WIND & CURE - VERTICAL	00001	10150		PW8/AURORA/MI TRIM DIPOLE	5/22/2002
MD	227244	E	MOLD RETAINER	00003	10151		LBQ 716 - PW8	5/22/2002

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MD	227250	G	MOLD RETAINER	00003	10151		LBQ 716 - PW8	5/22/2002
MD	227376	G	MOLD RETAINER 12" R.E.	00002	10151		LBQ 716 - PW8	5/22/2002
MD	227989	B	MOLD RETAINER 12" R.E.	00009	10151		LBQ 716 - PW8	5/22/2002
MD	227990	A	MOLD RTAINER 12" R.E.	00009	10151		LBQ 716 - PW8	5/22/2002
MC	227821	B	MOLD RETAINER - CENTER	00002	10151		LBQ SINGLE SHELL - PW8	5/22/2002
MC	227822	B	MOLD RETAINER - END	00007	10151		LBQ SINGLE SHELL - PW8	5/22/2002
AA	000041		MANDRELS, WINDING INNER & OUTER	00001	10151		LBQ - PW8	5/22/2002
AA	000042		MANDRELS, CURING INNER & OUTER	00001	10151		LBQ - PW8	5/22/2002
AA	000043		GAGE, COIL INSPECTION	00001	10151		LBQ - PW8	5/22/2002
AA	000044		BEAM TUBE - CURED - 110" LONG	00001	10151		LBQ - PW8	5/22/2002
ME	271943		TABLE, TRANSFER ASSEMBLY SSC-50MM	00001	10152		PW8/AURORA	5/24/2002
MD	225515		FIXT.-WIND.&CUR.(COOLING RING DIPL)	00001	10153		ITEM #97	7/11/96
MC	185755		GAGES,COIL-SMALL QUAD	00006	10245			7/11/96
MC	185759		GAGES,COIL-SMALL QUAD	00015	10245			7/11/96
MC	185763	A	GAGES,COIL-SMALL QUAD	00006	10245			7/11/96
MC	185824	A	GAGES,COIL-SMALL QUAD	00017	10245			7/11/96
MD	185153	A	CLAMPS & DETAILS,COIL,8TURN	00018	10246		SMQ	7/11/96
MD	198571		FIXTURE-COIL BRAZING,LGD & SMD	00002	10267			7/11/96
AA	000020		PLATES-VACUUM CHECK	00003	10359			7/11/96
AA	000030		END PLATES-VACUUM CHECK 24"O.D.	00002	10359			7/11/96
AA	000032		MTG BLOCKS-FOR P/N 20 & 30	00007	10359			7/11/96
ME	225620		FIXTURE, WINDING & CURING	00001	10498		ITEM 106	7/11/96
MB	069409	B	DIE-LAMINATION,STAMPING BOOSTER	00001	10508		I105-MP01&NL01	7/11/96
MB	256502		DIE-LAMINATION, STAMPING	00001	10508		I105	7/11/96
AA	000069		FIXTURE,CURING BUMP 10,20,30,40 TUR	00001	10548		ME 115262	7/11/96
ME	115262		FIXTURE, WINDING - BUMP	00001	10548		I105	3/8/2000
ME	198489		CURED MOLD ENDS-SDD SADDLE COIL	00001	10583		50D	7/11/96
AA	000126		FIRE BRICKS 2"X4"X8" (APPROX.90 EA)	00001	10598			7/11/96
AA	000081		STACKING RAILS-LGQ (HALF CORES)	00002	10692			7/11/96
AA	000024		TEST FIXTURE - I01/I02 MAGNETS	00001	10722		MTF	7/11/96
AA	000095		CLAMPS "C" - ASSORTED	00001	10773		CRATE	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MB	176210	A	DIE-LOOP BASE 1-2	00001	10783			12/3/99
MB	196053	B	DIE-LOOP BASE 2-4	00001	10783		STOCHASTIC COOL	12/3/99
ME	176580	C	MISC PARTS FOR STACKING TABLE	00001	10880		BOLTS,BUSHINGS,	7/11/96
MD	186519		DIE-LAMINATION STAMPING/TRIM DIPOLE	00001	10905		T-268	7/11/96
MA	192731		SLAC QUAD END COLLAR DIE	00001	10953		SLQ	7/11/96
AA	000137		2X MR COILS	00001	10984		I14 & I118	7/11/96
MD	101157	B	E/S MOLD LAMINATION DIE	00001	11074		DCL	7/11/96
MB	124647	A	DIE, INSULATION-OUTER END-DS	00001	11105		DCL	3/8/2000
MB	124648	A	DIE, INSULATION, INTERMED. END D.S.	00001	11105		DCL	3/8/2000
MB	124649	A	DIE, INSULATION INTERMED. END D.S.	00001	11105		DCL	3/8/2000
MB	124650	A	DIE, INSULATION-D.S. INNER END	00001	11105		DCL	3/8/2000
MB	124651	A	DIE, INSULATION -U.S. OUTER END	00001	11105		DCL	3/8/2000
MB	124652		DIE, INSULATION-U.S. OUTER END	00001	11105		DCL	3/8/2000
MB	124653		DIE, INSULATION-U.S. INTERMED. END	00001	11105		DCL	3/8/2000
MB	124654		DIE, INSULATION-U.S. INTERMED. END	00001	11105		DCL	3/8/2000
MB	124655		DIE, INSULATION-U.S. INNER END	00001	11105		DCL	3/8/2000
MB	124647	A	INSUL DIES FOR 124647-49,50-55(BOX)	00001	11105		DCL	3/8/2000
MB	124534		DIE - DCM, QCM SHIM CLIP HOLDER	00003	11169			7/11/96
MD	227238	E	DIES-OUTER MOLD LAMINATIONS	00002	11285		SHAVE/COMPOUND	7/11/96
MD	227237	E	DIES - INNER MOLD LAMINATIONS	00002	11286		COMPOUND/SHAVE	7/11/96
MB	227533	B	DIE,COMPOUND/SHAVING,6M OUTER COIL	00001	11321		LAM. DIE	7/11/96
MD	016670		DIE, OCTUPOLE LAMS.	00001	11322			7/11/96
MB	217570		DIE, CCL COLLAR LAMINATION	00001	11323		LBQ	7/11/96
MB	227575	B	DIES,6M INNER COIL MANDREL LAMS.	00002	11356		COMPOUND/SHAVE	7/11/96
MA	124229	A	DIE, PUNCH-ANCHOR INSUL. PLUG	00001	11405		DCM	3/8/2000
MA	124228	A	DIE, PUNCH-ANCHOR INSUL. RING	00001	11405		DCM	3/8/2000
MA	124228	A	PUNCH & DIE FOR 124228-229(CARTON)	00001	11405		DCM	3/8/2000
MA	106919	A	US 10 END TUBE FLG. REFLECTOR	00001	11762		DCM	7/11/96
MA	106921	A	DS 10 END TUBE FLG. REFLECTOR	00001	11762		DCM	7/11/96
MB	225867		SPACER BAR, B1 WELDING FIXTURE	00006	11763		REP: MD-176928	7/11/96
ME	210049		FIXTURE,ALIGNMENT OVERPASS DIPOLE	00001	11808		B-3	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	186638	A	DIE, B3 LAMINATION	00001	12096		P.O. 953720	6/1/99
AA	000071		(LOT) PARTS, MISC. 17M COILWINDING	00001	12149			7/11/96
AA	000074		(LOT) WINDING HARDBACKS	00001	12150			7/11/96
AA	000324		FIX., WINDING QSQE-1,COT-E #1	00001	12233		CCL	3/1/2000
MD	123117		SADDLES, SEXTUPOLES	00001	12234		CRATE	3/6/2002
MD	123117		SADDLES, OCTUPOLE	00001	12234		CRATE	3/6/2002
MB	217571		DIE, LBQ COLLAR LAMINATIONS	00001	12313		LBQ	7/11/96
MD	014408	A	DIE, SEXTUPOLE COMPOUND STAMPING	00001	12318		I136	7/11/96
ME	274002		FIXTURE,STACKING SEXTUPOLE	00001	12414		I36	7/11/96
ME	185071		STACKING FIXTURE, END PACK	00001	12415		SMQ	5/28/99
ME	027736		CORE,MAGNET CLASS 2-6-3-120	00001	12456		6-3-120	7/11/96
MD	150671		1-2 PICK-UP BEAM TUBE FIXT.	00002	12529		12G, 24G	7/11/96
MC	160569	A	BEAM TUBE HALF FIXTURE	00002	12529		12G, 24G	7/11/96
MD	160570		BEAM TUBE ALIGNMENT	00002	12529		12G, 24G	7/11/96
MD	160576		BEAM TUBE FIXTURE/HEAT SINK	00002	12529		12G, 24G	7/11/96
MD	160580		COMBINED BOARD CONNECTOR	00002	12529		12G, 24G	7/11/96
ME	196414		COMBINED BOARD FIXTURE	00001	12529		12G, 24G	7/11/96
MC	198148	A	EXPANSION, CAVITY FIXTURE	00008	12529		12G, 24G	7/11/96
ME	198151		FLIP FLOP FIXTURE	00001	12529		12G, 24G	7/11/96
ME	198423		BEAM TUBE FIXTURE	00001	12529		24G	7/11/96
MD	198467		BEAM TUBE/CAVITY ALIGNMENT	00001	12529		12G, 24G	7/11/96
MB	198944		COMPONET FIXTURE	00002	12529		12G	7/11/96
MD	198971		POSITIONING FIXTURE	00002	12529		12G, 24G	7/11/96
MD	210047		SIDE PLANE ALIGNMENT	00001	12529		12G, 24G	7/11/96
MD	274011		FIXTURE, WIND & CURING, SEXTUPOLE	00001	12555		PRIMARY COIL	7/11/96
MD	274012		FIXTURE, WIND & CURING SEXTUPOLE	00001	12555		SECONDARY COIL	7/11/96
ME	115547		STACKING PLATE(OLD STYLE)BUMP MAGNE	00001	12571		I168	7/11/96
ME	186714		WINDING FIXTURE	00001	12594		C MAGNET (I165)	7/11/96
MD	186717		STACKING FIXTURE	00001	12595		C MAGNET (I165)	7/11/96
MB	124579	C	DIE, IRON COLLAR LAMS	00001	12604		CCL	5/28/99
MD	139039		DIE - LAMINATIONS	00001	12654		MD-139039	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MD	176564		HOLD DOWNS	00004	12761		SMQ	7/11/96
MD	185951		STRANDS	00004	12761		SMQ	7/11/96
MB	217613		DIE, LBQ END IRON LAMINATION	00001	12926		LBQ	7/11/96
ME	019418	E	DIE, BUMP LAMINATION	00001	13092			7/11/96
MD	274204		FIX, WIND & CURING, L.H.(LINAC)	00001	13193		I175	7/11/96
MD	274294		FIX, WIND & CURING, R.H.(LINAC)	00001	13193		I175	7/11/96
ME	176709		SMALL QUAD #3 STACKING TABLE	00001	13195			7/11/96
ME	115328		DIE, COIL FORMING FOR 25"-35" BUMP	00001	13196			7/11/96
MD	197181		FORMS POTTING COVER ISOLATION CHOKE	00002	13218			7/11/96
MD	197182		FORMS POTTING COVER ISOLATION CHOKE	00002	13218			7/11/96
ME	139002	C	DIE, 6" SYMMETRIC LAMBERTSON	00001	13291		I169B	7/11/96
MD	119194	C	F17 LAMINATION INNER CORE - DIE	00001	13363		I94, I95, FMIC	3/8/2000
ME	227633	A	MOLD, INNER CURING 6M	00001	13378		LBQ	7/11/96
ME	227634	A	MOLD, OUTER CURING 6M	00001	13379		LBQ	7/11/96
MD	016379		COIL QUAD 7'	00003	13383			7/11/96
MD	016380		COIL, QUAD 7'	00003	13383			7/11/96
MD	016382		COIL, QUAD 7'	00003	13383			7/11/96
MD	001038		CORE, HALF QUAD 7'	00001	13384			7/11/96
MD	123275		E/S TOOLING, 7' QUAD TABLE	00002	13387			5/28/99
MC	227530	A	TOOLING, COIL WIND 132" & 232"	00001	13398		LBQ	7/11/96
ME	186837		LIFT FIXTURE	00001	13505		E687	3/8/2000
ME	71639		POTTING FIXT	00001	13523		I125	3/8/2000
ME	71641		POTTING FIXT	00001	13523		I125	3/8/2000
MD	136100	B	DIE, LAM E/O-A/O D.S. EXTRACTION	00001	13566		I169D	7/11/96
MD	274059	A	DIE, LINAC QUAD LAMINATIONS	00001	13661		I176	7/11/96
MD	274060		DIE, TRIMMED LINAC LAMS	00001	13661		I176	7/11/96
			PUMPS, HYDRAULIC	00003	13762		41694,41695,477	7/11/96
ME	274161		FIXTURE, CORE STACKING - LINAC	00003	13806		I37	7/11/96
MC	274165		FIX, STACKING CLAMP BARS - LINAC	00003	13806		I37	7/11/96
MB	274393		FIX., STACK LAMS, STOPS - LINAC	00003	13806		I37	7/11/96
MB	274394		FIX, STACK SHIM STOP - LINAC	00003	13806		I37	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MC	274493	A	FIX,COIL WINGING - G-10 - LINAC	00004	13806		I37	7/11/96
MC	274493		FIXTURE, COIL WINDING - LINAC	00006	13806		I37	7/11/96
MC	274494		FIXTURE, COIL CURING - LINAC	00008	13806		I37	7/11/96
MC	274510		FIX, WIND. MTG PLATES - LINAC	00006	13806		I37	7/11/96
ME	274152		BORE & FACE FIXT	00001	14776		I139	3/8/2000
ME	274152		FIX., BORING & FACING	00001	14776		M1 DIPOLE	3/8/2000
AA	000178		TABLE CARRIAGE ASSY	00001	15495			1/19/2000
AA	000179		SDC SHIPPING WEDGE	00002	16537			1/19/2000
			PARTS, MISC.	00001	16538		G-SDC TRANSPORT	7/11/96
			BEAMS, BOTTOM SUPPORT	00010	16539		C-SDC TRANSPORT	7/11/96
			SIDE SUPPORT ASSEMBLY	00008	16540		D-SDC TRANSPORT	7/11/96
			REAR SUPPORT ASSEMBLY	00001	16541		E-SDC TRANSPORT	7/11/96
			FRONT SUPPORT ASSEMBLY	00001	16542		F-SDC TRANSPORT	7/11/96
			STAND	00001	16543		I-SDC WEDGE	7/11/96
			RODS & CROSS MEMBER	00005	16544		SSC-Y&S PRESS	7/11/96
AA	000311		CDF MEGATILE SCANNER	00001	17396		CDF	3/1/2000
AA	000180		HYDRAULIC PUMP CONTROLLER	00001	17463			1/19/2000
AA	000334		CONTROLLER	00001	17463			3/1/2000
MC	198233		FIX, BENDING SMQ	00001	17657		SMQ	5/18/2001
AA	000253		MOTOR/CLUTCH	00002	17743		TOMPKINS	3/1/2000
AA	000254		SPEED-REDUCER	00001	17744		TOMPKINS	3/1/2000
AA	000255		PILLOW-BLOCK	00004	17745		TOMPKINS	3/1/2000
AA	000256		STANDS, ROTATION	00002	17746		WOODEN MODEL, SDC	3/1/2000
AA	000257		BRACKETS, SHIPPING CT	00001	17747		FOR SDC WEDGE	3/1/2000
AA	000258		FIXTURE FRAMEWORK	00001	17748		MERGE FOR SDC	3/1/2000
AA	000259		FIXTURE FRAMEWORK	00001	17749		MERGE FOR SDC WEDGE	3/1/2000
AA	000260		ROTATION STAND	00001	17750		FOR SDC WEDGE	3/1/2000
AA	000261		ROTATION STAND	00001	17751		FOR SDC WEDGE	3/1/2000
MB	318791		6-3-120 DIP APERATURE EXT LAM DIE	00001	17904		T215	3/8/2000
ME	274486		FIX., WINDING QUAD 84" & 100"	00001	18065		MIR	7/11/96
			SSC WRENCH FOR MAGNETS	00001	18354		SSC	7/11/96

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
AA	000317		B-3 WINDING PARTS-SIZING (CRATE)	00001	18508		B-3	3/1/2000
			TOOLING, MISC. LAMBERTSON	00001	18510		LAMBERTSON	7/11/96
			TOOLING, MISC. LAMBERTSON	00001	18542		LAMBERTSON	7/11/96
AA	000176		RELIANCE ELEC MOTOR	00001	18634			1/19/2000
AA			TOOLING, MISC LAMBERTSON BOX #4	00001	18682		LAMB	3/1/2000
ME	318435		SUPPORT, POTTING COVER - R.E.	00001	18683		145B	3/8/2000
			FIX, WIND & CURE 8.2 LAMBERTSON	00001	18684		LAMBERTSON	7/11/96
AA	000285		TOOLING, MISC. LAMBERTSON BOX #6	00001	18687		LAMB	3/1/2000
AA	000286		TOOLING, MISC LAMBERTSON BOX #5	00001	18688		LAMB	3/1/2000
ME	318434		FIX, L.E. POTTING COVER SUPPORT	00001	18690		MIR QUAD	7/11/96
			LEG, PIPE STYLE	00006	18889		3 POS. DIPOLES	7/11/96
			LEG, I BEAM STYLE	00002	18891		3 POS. DIPOLES	7/11/96
ME	318798		DIE, FMI QUAD LAMINATIONS	00001	18899		FMI QUAD	7/11/96
MD	217698		BRACKETS, CURING PRESS	00012	19944		SSC	7/11/96
AA	000287		TOOLING, COLUMN, VERT Y & S PRESS	00001	19946		SSC	3/1/2000
MC	271174		SPRING & SAFETY COVERS	00052	19954		Y & S PRESS	7/11/96
MD	271632		TOP SUP-PLATE	00007	19979		Y&S PRESS	7/11/96
ME	217753		TABLE BASE, YOKE & SKIN PRESS	00009	20046		SSC	7/11/96
ME	318530		WINDING, TOOLING 116" QUAD,NEW STYL	00001	20072		MAIN INJECTOR	7/11/96
MD	069867		DIE LAM./LAMB. WINDOW FOR MD-69866	00001	20296			4/26/99
MD	069866		DIE, LOWER LAMINATION	00001	20296		8GEV	7/11/96
MD	225478	A	DIE, LEFT CORE LAMINATION	00001	20298		8GEV	7/11/96
AA	000302		WINDER, WIRE WITH SLITTER	00001	20309		LBQ	3/1/2000
			TABLE,SMALL WIND PORT. TENSIONER	00001	20317			7/11/96
			ELEMENTS, SPOOL - CRATE #11	00001	20319		DSQ-II-173&OSQ-	7/11/96
			FIX,WINDING SPOOL COR. COIL	00001	20321		CRATE #16	7/11/96
ME	198683		FIX, COIL CURING-CENTER-F17 LAMB	00001	20348		I12	3/8/2000
ME	198658		FIX,WINDING LAMB BO/DO	00001	20408			7/11/96
ME	225380		FIX,WINDING LAMB-BO/DO	00001	20408			7/11/96
AA	000288		FIX, STACKING & HOLD DOWN BOLTS-LAMB	00001	20577		8GEV	3/1/2000
AA	000330		FIX,STACK LAMB 8GEV & HOLDDOWN	00001	20577		LAMB	3/1/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	198673		B3 COIL CURING FIXTURE	00001	20586		B-3	3/8/2000
AA	000312		B3 TRIM COIL WINDING TOOLING	00001	20588		B-3	3/1/2000
AA	000313		3Q120 COIL CURING FIXTURE	00001	20634		I10, I68, I102, T218	3/1/2000
AA	000318		ASSEMBLY TABLE 22 FT LG	00001	20714		LHC, SSC, TEV	3/1/2000
AA	000308		FIX., CLAMP MULTI MAGNET CORE	00001	20871		6-3-120,B0/D0,B1,B2	3/1/2000
AA	000175		LIFTING FIXT.	00001	20874		LGQ	1/19/2000
AA	000314		LIFTING FIXT-SINGLE/DBL CONV COIL	00009	20875		DCL, QCL	3/1/2000
			CABLE, SUPERCONDUCTING(COS)REEL	00001	21155		3U000108	11/22/99
AA	000289		TOOLING, DIPOLE COLLARING	00001	21286		DCL	3/1/2000
ME	331621		COIL CHECKING FIXT-FMI 'C' MAGNET	00001	21287		FMIC	3/8/2000
AA	000290		TOOLING, DIPOLE COIL COLLARING	00001	21289		DCL	3/1/2000
MA	126089		DIE, LAMINATION CORRECTION	00003	21290		CCL	3/8/2000
AA	000291		TOOLING, DIPOLE COLLAR COIL INSERT	00001	21292		DCL	3/1/2000
AA	000292		TOOLING, DIPOLE MISC ASSEMBLY	00001	21293		DCL	3/1/2000
AA	000293		MOLD, CORR. DOUBLR SPOOL BOX-POT	00001	21300		DCL	3/1/2000
AA	000295		TOOLING, DIP COLLARED COIL TWIST	00001	21418		DCL	3/1/2000
AA	000316		DIPOLE COLL COIL-TWIST TOOLING	00001	21418		DCL, DCM	3/1/2000
AA	000296		FIX., LIFT DOUBLER OUTER & MANDREL	00001	21423		DCL	3/1/2000
AA	000297		FIX., LIFT DOUBLER IN. PANCAKE COIL	00001	21424		DCL	3/1/2000
AA	245		SQA,B,C,D,E 5/6 CURE FIXT 34 1/2	00001	21519			12/3/99
AA	248		SQA,B,C,D,E 7 CURE FIXT 36 1/2	00001	21521			12/3/99
AA	247		SQA,B,C,D,E 7 CURE FIXT 29 1/16	00001	21523			12/3/99
AA	250		SQA,B,C,D,E 8 CURE FIXT 31 1/16	00001	21524			3/6/2002
AA	244		SQA,B,C,D,E 3/4 CURE FIXT 32 5/8	00001	21525		SMQ	12/3/99
AA	000249		SQA,B,C,D,E 7 CURE FIXT 55 7/16	00001	21528			12/3/99
AA	252		SQA,B,C,D,E 8 CURE FIXT 57 1/2	00001	21528			3/1/2000
AA	000304		TOPS, PIVOT WINDING PEDESTAL	00003	21604		SMQ	3/1/2000
AA	000251		UPPER LEAD Q.A. CHECKING FIXTURE	00001	21640		ITEM #I 139	3/1/2000
MD	225623		FIX., CURING INNER COIL #47	00001	21749		B2	4/7/2000
MD	176928		ASSY, COIL INNER & OUTER	00001	21750		B1 & B2	4/7/2000
MD	225419		FIX. CURING OUTER COIL #48	00001	21750		B1 & B2	4/7/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MD	176928		FIX., STRAIGHTING 10' & 20'	00001	21750		B1 & B2	4/7/2000
ME	331520		FIX, COIL WINDING	00001	21751		LAMB	6/12/2000
MD	176828		COIL ASSY FIXT	00001	21752		B1	3/8/2000
AA	000309		FIXTURE, LIFTING COIL	00002	21811			3/1/2000
AA	000341		FIX, 4-4-30 POTTING PAN & COIL	00002	21947			3/6/2002
AA	000268		MISC. LBQ COILS	00001	21958		LBQ	3/1/2000
AA	000264		TOOLING, LBQ OUTER WINDING	00001	21959		LBQ	3/1/2000
AA	000265		TOOLING, LBQ 54” WINDING	00001	21960		LBQ	3/1/2000
AA	000273		MAGNET, LBQ RD 1 A	00001	21961		LBQ	3/1/2000
AA	000272		TOOLING, DIPOLE COIL WINDING	00001	21962		E/S	3/1/2000
ME	301311		ASSY. END SQUEEZER	00001	21963		50mm	4/7/2000
AA	000267		TOOLING, WIND, MANDRELS, RETAINER,	00001	21964		LBQ	3/1/2000
AA	000266		TOOLING, INNER COIL Q1 & Q5	00001	21965		LBQ	3/1/2000
AA	000310		MOLD,CURING,WIND,MANDREL& ACCES	00001	21966		LBO	3/1/2000
AA	000335		SEXTUPOLE WINDING/CURING TOOLING	00001	22146		SEXT	3/1/2000
AA	000349		LIDS, MOLD CURING #1	00001	22153		I139	5/11/2001
AA	000346		MI DIPOLE MOLD PARTS, BOX #1	00001	22154		I139	5/14/2001
AA	000347		MOLD PARTS, MIR DIPOLE (BOX #2)	00001	22159		I139	5/11/2001
ME	351318		BAR, SIDE ANGLE & TOP CLAMP	00001	22177		SMD	5/18/2001
MD	351319		RAIL, SAGITTA 96.75" SDE MAGNET	00001	22177		SMD	5/18/2001
MD	351320		PUSHER PLATE - SDE	00001	22177		SMD	5/18/2001
MC	351322		END PACK STACKING PLATE - SDE	00001	22177		SMD	5/18/2001
ME	351317		BAR, MOUNTING - SDE	00001	22177		SMD	5/21/2001
AA	246		SQA,B,C,D,E 5/6 CURE FIXT	00001	22178			12/3/99
ME	186070		FIXTURE, CURING 7 TURN	00001	22182		LGQ	3/27/2002
ME	185612		LQB 2 & 3 TURN CURING FIXTURE	00001	22184		ME-185612	6/1/99
AA	000327		STACKER, HYDRAULIC	00001	22307	51730		2/26/2002
MD	176018		FIXTURE, MISCELLANEOUS	00001	22430		SMQ	3/8/2000
MD	318614		FIX., WELDING CLAMP - 160"	00001	22433		I139	3/8/2000
MD	318615		FIX., CLAMPING WELDING - 240"	00001	22433		I139	3/8/2000
MD	318616		FIX., HALFCORE POS. & CLAMP	00001	22433		I139	3/8/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
AA	000173		FIX, WIND./TOOLING	00001	22434		PET	1/19/2000
MD	343050		FIXTURE, COIL WINDING & TOOLING	00001	22434		PET	3/8/2000
ME	185580		LQL 7 TURN WINDING FIXTURE	00001	22538		ME-185580	6/1/99
ME	185579		LQL 4 & 5 TURN WINDING FIXTURE	00001	22539		ME-185579	6/1/99
ME	351317		HOLD DOWN BARS ONLY-STACK-SDE	00001	22540		SMD	5/21/2001
AA	000344		MISC, PARTS LQ 7 TURN	00001	22575		LGQ	5/11/2001
AA	000345		GRITBLASTER, PENCIL PORTABLE	00002	22576			5/11/2001
ME	185578		MANDREL, WIND 2-3 TURN	00001	22577		LQC	5/11/2001
ME	185573		LQA 4 & 5 TURN WINDING FIXTURE	00001	22578		ME-185573	5/18/2001
ME	185579		MANDREL, WIND 4-5 TURN	00001	22578		LQA	5/11/2001
MD	331846	B	FLG ASSEM,BAKE-OUT,PUMP DOWN	00001	22880		LAMB	6/12/2000
MD	331847	B	FLG ASSEM,BAKE-OUT,PUMP DOWN	00001	22880		LAMB	6/12/2000
MA	331510		FLG ASSY, QUICK RELEASE,BAKE-OUT	00001	22880		LAMB	6/12/2000
AA	000328		LEG, ASSEMBLY	00003	23108			3/1/2000
ME	198329		FIX, CURING 4-5 TURN	00001	23116		LGD	3/8/2000
ME	186057		FIX., CURE LQC & F, 4-5 TURN	00001	23116		LGQ	5/11/2001
MB	351138		FIXTURE, CURING	00001	23117			3/8/2000
MB	351138		FIXTURE, CURING	00001	23117			3/8/2000
ME	186054		FIX, CURE LQC & F, 2-3 TURN	00001	23117		LGQ	5/11/2001
ME	186055		FIX, CURE LQC & F, 2-3 TURN	00001	23117		LGQ	5/11/2001
ME	186056		FIX, CURE LQC & F , 2-3 TURN	00001	23117		LGQ	5/11/2001
ME	351379		FIX., CURING	00001	23118			3/8/2000
ME	351097		FIX. CURE, LQC & F , 5 OR 7 TURN	00001	23118		LGQ	5/11/2001
ME	351081		FIX.,CURE, LQC & F, 5 0R 7 TURN	00001	23118		LGQ	5/11/2001
ME	186059		FIX., CURE LQC & F, 5 OR 7 TURN	00001	23118		LGQ	5/11/2001
ME	186058		FIX., CURE LQC & F , 5 OR 7 TURN	00001	23118		LGQ	5/11/2001
MD	338266	B	DIES,DRAW RGF POLE PIECE, 1ST & 2ND	00002	23383		RGRD	6/12/2000
MD	338312		DIES,DRAW RGD POLE PIECE, 1ST & 2ND	00002	23383		RGRD	6/12/2000
AA	000263		WASHER, CLENOMAT - 18" BEH	00001	23491		FNAL #67356	12/3/99
AA	000274		SOLDERING,COOLING STATION-CONDUC	00001	23653			3/1/2000
MC	338265	A	DIES, DRAWN QUAD 1ST FINAL	00000	23688		U/C RECYCLER	9/29/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MD	338367	A	DIE,LAM. DISP. SUPPRESSOR-DEFOCUS	00001	23754		U/C RSDM	3/8/2000
MD	338366	A	DIE, LAM DISP. SUPPRESS-FOCUSING	00001	23754		U/C RSDM	3/8/2000
MD	338218	B	DIE, LAM - RECYCLER - RGDF	00001	23754		RGDF	3/8/2000
ME	274020		DIE, LAMINATION	00001	23757		I139	3/8/2000
MC	318168		DIE, LAM TRIMMED END PACK	00001	23758		I139	5/11/2001
MA	341181		SPUR GEAR	00001	23770		RRQS	3/8/2000
MA	341180		WORM GEAR	00001	23771		RRQS	3/8/2000
AA	000277		HEATER SYS HYDROTHERM-CURING PRESS	00001	23877		SSC	3/1/2000
AA	000276		TRACK, WELDING Y & S PRESS	00001	23878		SSC	3/1/2000
AA	000326		CUTLER, PIPE-LBQ COLD MASS	00001	24191		LBQ	3/1/2000
ME	116296		3Q60/120 STACK & ASSY FIXT & C FRAME	00001	24199		MI3Q	3/8/2000
AA	000331		MAGNITIZER, 7FT SHUTTLE & CRANKS	00001	24202		RGD, RGF, SGF, SGD	3/1/2000
ME	185596	A	FIXT. - CURING 5 & 6 TURN/REWRK SQB	00001	24219		ME-185596	7/21/99
ME	176577		FIXTURE, CURING 7 TURN	00001	24220		SQE	3/27/2002
ME	185277		FIXTURE, CURING 7 TURN	00001	24221		SQC	3/27/2002
ME	185278		MANDREL, WIND, SQC 7 TURN	00001	24222		SQC	5/11/2001
ME	185275		3-4 T WIND MAND	00001	24223			3/8/2000
ME	185276		MANDREL,5-6 TURN,SQC,WINDING	00001	24224		SM QUAD	2/9/2001
ME	185564		MANDREL, WIND SQB 3-4TURN	00001	24225		SMQ	5/18/2001
ME	185566		FIXTURE - 7 COIL WINDING SQB	00001	24226			7/21/99
MC	122010		DIE,L.H. CLAMP COLLAR - STAMPING	00001	24231		DCL	3/8/2000
MB	103592	A	DIE,NOTCHED FULL BODY COLLAR-O	00001	24233		QCL	9/22/99
MA	227251		DIE, INNER COIL WIND SEG. LAM.	00001	24233		LBQ	9/15/99
MA	227262		DIE, OUTER COIL WIND SEG. LAM.	00001	24233		LBQ	9/15/99
MC	115020		DIE,STAMPING END COIL CLAMP COLLAR	00005	24234		DCL	3/8/2000
MB	192980	A	DIE-LAMS.(COLLAR END IRON LAMS.)	00001	24235		LBQ	9/15/99
MB	227381	C	INNER COIL MANDREL LAM DIE	00001	24236		SSC, 4CM	3/8/2000
MB	227363	C	COMPOUND OUTER COIL MANDREL DIE	00001	24236		SSC 4CM	3/8/2000
ME	318221	B	FMI SEXTUPOLE LAM DIE	00001	24237		SEXT	9/27/99
MC	122009		DIE, STAMPING R.H. COLLAR	00004	24238		DCL	3/8/2000
MD	318600		DIE,STAMPING FMI QUAD LAM - DIE #2	00001	24239		M1 QUAD	3/8/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	116058	D	FMI 3Q60/120 LAM DIE	00001	24240		MI3Q	3/8/2000
MD	331498	A	FMI HORIZ. TRIM DIPOLE LAM DIE	00001	24242		HTD	3/8/2000
MD	331497		FMI VERT TRIM DIPOLE LAM DIE	00001	24243		VTD	3/8/2000
MC	115390		STAMPING DIE-POLE TIP SPACER LAMS	00001	24244		3Q120	9/29/99
ME	274020		LAM DIE	00001	24245		I139A	3/8/2000
ME	331184		DIE, OUTER LAMINATION	00001	24246		M1 LAMB	3/8/2000
MB	192925	A	DIE, LBQ IRON LAMINATIONS	00001	24247		LBQ	9/15/99
MD	176020		DIE , LAMINATION - LQF	00001	24248		LGQ	5/18/2001
ME	176517		STACKER PLATE ASSY.	00001	24277		SMQ	5/28/99
MD	176520		PRESSURE PLATES	00002	24278		SMQ	5/28/99
MD	217706		DIE,STAMPING IRON YOKE LAMINATIONS	00001	24332		SSC	3/8/2000
ME	351350	D	FMI MAG TRIM SKEW VERT/HORIZ COILS	00001	24376		HTD, VTD	3/8/2000
AA	000336		FMI VERT/HORIZ WIND & CURE FIXT	00001	24376		HTD, VTD	3/1/2000
ME	185292		FIXTURE, LIFTING SMALL DIPOLE	00001	24412		SMD	3/6/2002
ME	185293		FIXTURE, LIFTING SAMMM DIPOLE	00001	24414		SMD	3/6/2002
ME	115399		3Q60/120 QUAD WINDING & CUR MANDR	00001	25316		MI3Q	2/9/2001
MC	115588		TOOLS, LEAD BEND & FORMING	00001	25317		(3Q120) I110	2/9/2001
ME	122813		FIX,WINDING CORRECTION COIL	00001	25532		CCL	3/6/2002
ME	185249		FIX., LIFTING SMALL DIPOLE	00001	25542		SMD	3/6/2002
ME	185270		FIX., LIFTING LARGE DIPOLE	00001	25543		LGD	3/6/2002
ME	185270		FIX., LIFTING LARGE DIPOLE	00001	25544		LGD	3/6/2002
ME	185249		FIX., LIFTING SMALL DIPOLE	00001	25545		SMD	3/6/2002
ME	115601		FIX, WIND & CURE 8.2' & 7.5'	00001	25661		LAMB	1/19/2000
MD	322698		DIE, LAMINATION SEPTUM	00001	25707		SEP	1/19/2000
MD	225477		DIE, P/O PORT LAMINATION	00001	25708		8GEV	1/19/2000
MD	225478		DIE, LOWER CORE LAMINATION	00001	25709		8GEV	1/19/2000
MD	69866		DIE, LOWER LAMINATION	00001	25710		8GEV	1/19/2000
ME	351737		TOOLING, MAGNET POTTING	00001	25769		PBAR SKEW SEXTUPOLE	2/26/2001
ME	344038	C	OUTER MOLD LAMINATION DIE	00001	25864		LHC	2/21/2000
ME	198990		FIX.,CURING INNER & OUTER 5' & 10'	00001	25902		B-1 MOD	2/21/2000
ME	198995		FIX, WIND. W/SHAPING HEADS	00001	25903		B-1 MOD	2/21/2000

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
AA	000340		PRESS, MURDOCK COLLARING	00001	26034			3/6/2002
AA	000339		MODULE, MULTIPLEXER,RELAY,MISC ELEC.	00001	26050			3/6/2002
ME	344107	C	INNER MOLD LAMINATION DIE SET		26122		LHC, STOR LOC W2R11S7B2	5/15/2000
MD	344419		IR QUAD SHORT/LONG STACK ASSEM		26159		LHC, STOR LOC W2R185FB4	5/15/2000
MB	344062		OUT/IN MANDREL SIDE STIFFENER PLATES	00011	26181		W2R1454B3, U/C LHC	8/16/2000
MD	344810		IN MANDREL CURING RETAINERS	00004	26181		W2R1454B3, U/C LHC	8/16/2000
MD	344807		OUT MANDREL CURING RETAINERS	00004	26181		U/C LHC	8/16/2000
MD	344814		IN MANDREL CURING RETAINERS	00004	26181		U/C LHC	8/16/2000
MD	344110		INNER MANDREL CURING RETAINER	00001	26181		U/C LHC	8/16/2000
ME	344867		INNER MANDREL CURING RETAINER	00001	26181		U/C LHC	8/16/2000
ME	344952		INNER MANDREL CURING RETAINERS	00002	26181		U/C LHC	8/16/2000
ME	344953		INNER MANDREL CURING RETAINERS	00002	26181		U/C LHC	8/16/2000
ME	185568		FIXTURE - 3 & 4 COIL WINDING SQE	00001	26647			5/21/2001
MC	185366		MANDREL,WIND 3-4 TURN BEND ATTACH	00001	26647		SMQ	5/21/2001
MC	185367		MANDREL,WIND 3-4 TURN BEND ATTACH	00001	26647		SMQ	5/21/2001
ME	185571		MANDREL, WIND 8 TURN SQE	00001	26648		SMQ	5/21/2001
MD	185541		MANDREL, WIND BEND ATTACH, 8	00001	26648		SMQ	5/21/2001
MD	185542		MANDREL, WIND BEND ATTACH, 8	00001	26648		SMQ	5/21/2001
MD	185543		MANDREL, WIND BEND ATTACH 8 TURN-SQE	00001	26648		SMQ	5/21/2001
ME	185570		MANDREL,WIND 7-TURN - SQE	00001	26649		SMQ	5/21/2001
MD	185371		MANDREL,WIND BEND ATTACH 7 TURN-SQE	00001	26649		SMQ	5/21/2001
MD	185372		MANDREL, WIND BEND ATTACH, 7	00001	26649		SMQ	5/21/2001
MB	351605		FIXTURE, COIL CURING	00001	26695		QXR	12/1/2000
MC	351707		FIX., B.T. POTTING - QXR	00001	26696		QXR	8/3/2001
ME	185591		SQE 3-4 TURN CURING FIXTURE	00001	26840		SQE	9/18/2000
ME	185592		SQE 5-6 TURN CURING FIXTURE	00001	26842		SQE	9/18/2000
ME	185593		SQE 7 TURN CURING FIXTURE	00001	26843		SQE	9/18/2000
ME	185594		SQE 8 TURN CURING FIXTURE	00001	26844		SQE	9/18/2000
ME	318140		BRAZING FIXTURE	00001	26845		SQE	9/18/2000
ME	185569		MANDREL,WIND 5-6 TURN - SQE	00001	27010		SMQ	5/21/2001
MD	185369		MANDREL, WIND BEND ATTACH- 5-6-SQE	00001	27010		SMQ	5/21/2001

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MD	185320		MANDREL,WIND BEND ATTACH- 5-6-SQE	00001	27010		SMQ	5/21/2001
AA	000002		FIXTURE,CLAMP TOP&SIDE (2 SKID=1UNIT)	00001	27060		SMD	11/28/2001
AA	000001		FIXTURE,CLAMP TOP&SIDE (2SKID=1UNIT)	00001	27061		SMD	11/28/2001
			CYL, HYDR 150 TON XRC-1503C	00060	27139		3IN TRAVEL SSC	3/22/2002
ME	271919		CYL. HYDR 60 TON (RCH 603)	00085	27143		SSC/ALSO SMR 27144 & 145	3/22/2002
MD	271648		PLATES, TOP - Y&S PRESS (SKIDS)	00013	27146		SSC / ALSO SMR 271147	3/22/2002
ME	176616		WINDER,LARGE TBL FLIP PED&BASE	00002	27151	41341		3/22/2002
AA	000007		APPLICATOR,CRATE#5 62X60X28	00001	27193		LBQ	3/6/2002
AA	000008		APPLICATOR,CRATE#6 48X65X48	00001	27194		LBQ	3/6/2002
AA	000009		APPLICATOR,CRATE#7 52X46X59	00001	27195		LBQ	3/6/2002
AA	000010		APPLICATOR, CRATE#3 45X78X65	00001	27196		LBQ	3/6/2002
MD	119184	A	DIE, LAM LAMB F-17 "C" MAGNET	00001	27540		LAMB	3/8/2001
ME	331191	C	DIE,LAM-INNER PUMP-OUT	00001	27541		LAMB	3/8/2001
ME	331132	C	DIE, LAMINATION, INNER	00001	27541		LAMB	3/8/2001
ME	331384	A	DIE, LAM. INNER BLANK	00001	27541		LAMB	3/8/2001
MA	263165		CYL., HYD. OTC #RH1003,100 TON	00205	276246		SSC (OLD SMR 19953) YELLOW	3/22/2002
AA	000006		APPLICATOR,CRATE#2 48X48X65	00001	2792		LBQ	3/6/2002
			WINDER,SPOOL COR. COIL TABLE	00002	34851			3/22/2002
ME	388166		MANDREL WINDING, D.C. LAMBERTSON	1	388166		BLAM	3/21/2002
ME	388202		TOOLING, HALF CORE STACKING	1	388202		BLAM	3/21/2002
AA	000011		APPLICATOR, PLASTIC TAPE	00001	39761		LBQ	3/6/2002
AA	000012		TABLE, HYDRAULIC	00001	41341			3/6/2002
AA	000198		FIXTURE ROLLOVER/CAP. EQUIP. #45668	00001	45668		6,000 LB. CAP.	3/22/2002
			FIXTURE, ROLLOVER, 15 TON FLIP RITE	00001	45788		36X10'8"X33	3/22/2002
			PRESS, HYDRAULIC	00001	47916			3/22/2002
AA	000038		HYDRALIC STACKER	00001	51730			3/26/2002
AA	000015		DEWAR,HELIUM HEAT LEAK	00001	55378		HOLD FOR B.BORORSKI	3/6/2002
			BAR,SPREADER,40MM COMPLETE MAG	00001	55587			3/22/2002
ME	160079	1	RINGS, LOADED QUADS	00001	6161			7/11/96
ME	160112	1	RINGS, LOADED QUADS	00001	6161			7/11/96
AA	000047		ROLLCOATER/APPLICATOR, AHESIVE 52"	00001	64045		S38/A/MCD10043/OLD#90182	3/27/2002

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
AA	000004		Cleaner, Parts 52" (Clean-O-Mat)	00001	67536			3/6/2002
MC	016699		FIXTURE,WELDING	00001	7447		MC-016699	7/11/96
AA	000013		STACKING TABLE/EXTENSION TUBES	00001	7758		1/4 CORES	11/28/2001
AA	000014		STACKING TABLE/4Q120, 1/4 CORE	00001	7759			7/11/96
MD	002126		DIE, LAMINATION	00001	81284		BOOSTER	3/1/2000
MD	002127		DIE, LAMINATION	00001	81284		BOOSTER	3/1/2000
ME	227175		MACHINE, INLINE CABLE INSPECTION	00001	85296		S38/A/MCD10044/OLD#90181	8/20/2002
ME	198832		FIXTURE-WINDING "C" MAGNET	00001	8532			6/28/99
ME	210004		FIXTURE-CURING "C" MAGNET, TEV I	00001	8532		ITEM #6	6/28/99
AA	000337		HOIST, UNDER HOOK - ROLLOVER		85824		U/C NOT AVAILABLE	3/22/2002
AA	000004		TRAILER, FALT BED	00001	85825			3/6/2002
MD	116815		FIXTURE, LIFTING LAMBERTSON	00002	90043		LAMBERTSON	7/11/96
			GROUT/EPOXY FOR TABLES (SKIDS)	00002	90066		RIHEL/SLIWICKI	7/11/96
MB	196836		VOID FILLER DIE (3Q60 & 3Q120)	00001	90164		MI3Q	9/15/99
			THERMAL BRAKE,17MM CURING PRESS	00001	AUROR		SSC	12/1/2000
			CHANNEL WELDMENTS W/NOTCHES	00003	AUROR		SSC	7/11/96
			MTF TEST STAND PARTS,SSCL 36 PC	00001	AUROR			7/11/96
			DOWTHERM PUMP & MOTOR UNIT	00001	AUROR		IB2 BOILER	7/11/96
MD	176018	1	FIX, INSPECTION LAMINATIONS	00002	AUROR		SMQ	7/11/96
			FIX, POTTING 2 WAY LAMBERTSON	00001	AURORA		90021	3/25/99
AA	000003		FIXTURE STACKING/L.B. HALFCORES	00001	AURORA		06736	3/25/99
AA	000159		6-3-120 SADDLE CASTING MOLD (NEW)	00001	AURORA		12355	8/20/2002
AA	000160		6-3-120 SADDLE/PANCAKE WIND JIG	00001	AURORA		12356	3/25/99
AA	000161		MOLD, OLD STYLE COIL CASTING	00001	AURORA		12355	3/25/99
MD	016370		MISC. STACKING GUIDES 6-3-120 MAGNE	00001	AURORA		T-215 ,SMR# 10495	4/26/99
ME	024588		COILS - INNER - 2 WAY LAM.	00001	AURORA		SMR# 06310	4/26/99
MC	111667		FIXT.-4Q120 MAG. WINDING LF HD DIE	00001	AURORA		SMR# 08110	4/28/99
ME	115262	B	FIXTURE, COIL WINDING (BUMP)	00001	AURORA		SMR# 13191	4/28/99
MD	176485	C	BRAZING FIXTURE-COOLING FIN (1'X10'	00001	AURORA		SMR# 10723 3Q120	5/28/99
MD	198482		FIXTURE SUPPORT RAIL (SDC & SDD)	00001	AURORA		SMR# 08062 ME-198479	6/4/99
MD	198483		FIXTURE GUIDE RAIL (SDC & SDD)	00002	AURORA		SMR# 08062 ME-198479	6/4/99

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	198554		FIX, CURING SET-UP FOR	00001	AURORA		SDA, LGD, SMD , SMR# 08116	6/4/99
ME	198627	A	FIXTURE-LGD PANCAKE COIL CURE 18'LG	00001	AURORA		SMR# 07980	6/4/99
ME	210180		WINDING & CURING FIXTURE (ITEM #40)	00001	AURORA		SMR# 08998	6/28/99
MD	225202		FIX,INNER COIL CURING (B-1)	00001	AURORA		SMR# 13187, B-1	6/28/99
MD	225335		SIDE PLATE/WINDING & CURING FIXTURE	00001	AURORA		SMR# 09780, ITEM #62	6/28/99
MD	225380		BASE PLATE/WINDING & CURING FIXTURE	00001	AURORA		SMR# 09780, ITEM #62	6/28/99
ME	274736		POTTING & CURING MIR COIL	00001	AURORA		SMR #13414	8/9/99
MB	274790		PATTERN, MOLD 2A CASTING	00001	AURORA		SMR# 90067 MIR QUAD	8/9/99
ME	274929		FIX, COIL CURING & WINDING	00001	AURORA		CHEAP CHOKE , SMR# 90026	8/9/99
ME	318000		160" DIPOLE CURING FIXTURE	00001	AURORA		SMR# 90058, MIR	9/1/99
ME	318000		ALPHA MOLD	00001	AURORA		SMR# 90062, I137	4/7/2000
MD	116058	C	3Q120/3Q60LAMINATION DIE	00001	AURORA		SMR# 90081	4/28/99
			FMI VERT TRIM DIP WINDING TOOLING	00001	AURORA		SMR 90158, VTD	11/22/99
			FMI HORIZ TRIM DIP WINDING TOOLING	00001	AURORA		SMR 90158, HTD	11/22/99
			FMI VERT TRIM DIP COIL CURING MOLDS	00004	AURORA		SMR 90158, VTD	12/3/99
			FMI HORIZON TRIM DIP COIL CUR MOLDS	00004	AURORA		SMR 90158, HTD	12/3/99
MB	338446		HOLDER,RECYC MACH SHIM CONTOUR	00002	AURORA		SMR #90168, RGD	6/12/2000
MB	338413		HOLDER,RECYC MACH SHIM CONTOUR	00002	AURORA		SMR #90168, RGF	6/12/2000
MB	338448		HOLDER,RECYC MACH SHIM CONTOUR	00002	AURORA		SMR #90168, SGF	6/12/2000
MB	338450		HOLDER,RECYC MACH SHIM CONTOUR	00002	AURORA		SMR #90168, SGD	6/12/2000
AA	000269		WINDING TABLE - 24”-MACHINE REPAIR	00001	AURORA		SMR# 90108	3/1/2000
AA	000270		WINDING TABLE- 36”-MACHINE REPAIR	00001	AURORA		SMR# 90109, FNAL# 26437	3/1/2000
ME	369190		INCOMPLETE DIE-LHC COLLAR LAM	00000	AURORA		LHCP	1/23/2001
MD	227309	G	36" MOLD RETAINER	00001	ICBOS		SC3, CWC	7/11/96
MD	227317	G	36" MOLD RETAINER	00001	ICBOS		CWC	7/11/96
MB	185271		Screw, Lifting - Large Dipole	00008	MB 185271		LGD	3/6/2002
MB	185294		Screw, Lifting Small Dipole	00008	MB 185294		SMD	3/6/2002
MB	185271	1	Screw, Lifting, Large Dipole	00008	MB185271-		LGD	3/6/2002
MB	185294	1	Screw, Lifting Small Dipole	00008	MB185294-		SMD	3/6/2002
MB	192929		DIES-PULL TRUSION	00001	MB192929		S-38/AURORA #11143	3/26/2002
MB	192930		DIES-PULL TRUSION	00001	MB192930		S-38/AURORA# 11143	3/26/2002

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
MB	192931		DIES-PULL TRUSION	00001	MB192931		S-38/AURORA# 11143	3/26/2002
MB	192932		DIES-PULL TRUSION	00001	MB192932		S-38/AURORA# 11143	3/26/2002
MB	192933		DIES-PULL TRUSION	00001	MB192933		S-38/AURORA# 11143	3/26/2002
MB	192934		DIES-PULL TRUSION	00001	MB192934		S-38/AURORA# 11143	3/26/2002
MD	318275		STACKER,160"SPACER HALF CORE	00001	MD318275		S38/AURORA MCD 10026	3/26/2002
MD	331160		FIX, ROLLOVER 160” & 240” - SET 20F2	00001	MD331160		90120	3/22/2002
ME	115528		BUMP COIL WINDING FIXTURE	00001	ME115528		S38/AURORA/ MCD #10040	8/22/2002
ME	176586	B	COIL WIND. FIXT. 3 & 4 (TEV I SQ) - SMQ	00001	ME176586		S38/AURORA / MCD #10058	8/21/2002
ME	176596	A	COIL WIND. FIXT. 5 & 6 (TEV I SQ) - SMQ	00001	ME176596		S38/AURORA/ MCD #10059	8/21/2002
ME	176604	B	COIL WIND. FIXT. 7 (TEV I SQ) - SMQ	00001	ME176604		S38AURORA/ MCD #10057	8/21/2002
ME	176609	A	COIL WIND. FIXT. 8 (TEV I SQ) - SMQ	00001	ME176609		S38/AURORA/ MCD #10056	8/21/2002
ME	176623		PEDESTAL, WIND. MANDREL PIVOT	00001	ME176623			3/6/2002
ME	186816		FIXTURE WINDING 11 TURN	00001	ME186816		S38/AURORA#10537 MCD10023	3/26/2002
ME	186825		FIXTURE WINDING 5 TURN	00001	ME186825		S38/AURORA#10537 MDC10023	3/26/2002
ME	225391		FIXT.,WINDING ASSY. VERNIER MAGNET	00001	ME225391		S-38/AURORA#11832	3/26/2002
ME	225392		FIXTURE, CURING MODIF7ASSY. VENIER	00001	ME225392		S-38/AURORA#11832	3/26/2002
ME	225689	A	MOLD & PATTERN, L.E. POTTING COVERS	00001	ME225689		S-38/AURORA#90042 B2A	3/26/2002
ME	225691	A	MOLD& PATTERN, R.E. POTTING COVERS	00001	ME225691		S-38/AURORA#90042 B2A	3/26/2002
ME	271620		TOOLING, YOKE & SKINNING PRESS	00002	ME271620		SMR # 90104, SSC	3/22/2002
ME	274140	D	FIX.,STACKER R.H. PACK & ADAPTER	00001	ME274140		S-38/AURORA/ MCD #10027	8/21/2002
ME	274140	D	FIX., STACKING L.H. END PACKS	00001	ME274140		S-38/AURORA/ MCD #10028	8/21/2002
ME	318282		fIXTURE, STACKING HALF CORES	00001	ME318282		MI SEXT	3/6/2002
ME	331622		COIL MEASURING, TABLE MOUNTING	00001	ME331622		SMR# 90142, LAMB TOOLING	3/22/2002
ME	83006		FIX,WIND&CURE58DEGREE“C”MAGNET	00001	ME83006		Old SMR#90114	3/22/2002
ME	83008		FIX,WIND&CURE32DEGREE”H”MAGNET	00001	ME83008		Old SMR#90114	3/22/2002
MA	125338		TEV SPOOL TAG ARTWORK	00001	MODEL		S43, S72	3/8/2000
MB	276960	B	LBQ SPOOL TAG ARTWORK	00001	MODEL		LBQS	3/8/2000
MD	84561	B	DIE-MR LAM FOR CHOKE PASSIVE SYSTEM	00001	NT 27538			4/23/2001
ME	369190		LG. COLLAR PACK LAM DIE-INCOMPLETE	00001	NT 27539		LHCP	4/23/2001
AA	000023		SITE RISERS, MAIN INJECTOR	00007	NT01337			3/6/2002
MC	124983		PURGE COVER MOLD	00001	NT01773		DCM	12/11/2001

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	185587		FIX, CURE 3 & 4 TURN - SQC	00001	NT01774		90116	3/22/2002
ME	185588		FIX, CURE 5 & 6 TURN - SQC	00001	NT01775		90116	3/22/2002
MB	338259		Die, Cut-Off Compensator	00001	NT01779		Recycler	3/6/2002
MB	369280		Die, Yoke Lamination	00001	NT01780		LHC	3/6/2002
ME	137000		FIX, STACK, WIND, CURE - DOGLEG	00002	NT01781		Dogleg	12/11/2001
MC	331664		FMI VERT TRIM DIPOLE COIL GAGE	00001	NT01782		VTD	12/11/2001
MC	331665		FME HORIZ TRIM DIPOLE COIL GAGE	00001	NT01783		HTD	12/11/2001
MD	137007		Die, Lamination Dogleg	00001	NT01784		Dogleg	3/6/2002
ME	185589		FIX, CURE 7 TURN - SQC	00001	NT01793		90115	3/22/2002
ME	185590		FIX, CURE 8 TURN - SQC	00001	NT01794		90115	3/22/2002
ME	344186	1	STANDS, ROTATING QUADS	00001	NT01855		RECYCLER 20" QUAD	3/6/2002
ME	344186	3	CHANNELS, BOX FOR ROTATING QUADS	00001	NT01856		RECYCLER 20" QUAD	3/6/2002
ME	344186	2	CHANNELS, BOX FOR ROTATING QUADS	00001	NT01857		RECYCLER 20" QUAD	3/6/2002
ME	344186	4	END PLATES FOR ROTATING QUAD	00001	NT01868		RECYCLER 20" QUAD	3/6/2002
ME	344186		PARTS FOR ROTATING STANDS	00001	NT01871		RECYLER 20" QUAD	3/6/2002
AA	000019		Pivots, Mandrel End Support	00001	NT02356		Pair	3/6/2002
AA	000352		CLAMPS, HOLDOWN, MIR	00004	NT0249		OLD SMR390112	3/22/2002
AA	000029		PLASTIC,SCINTILLATOR - P. MAZUR	00001	NT02494			3/6/2002
AA	000022		COUNTER,W/FIBER READOUT-SCINTILL.	00001	NT02496			3/6/2002
AA	000025		TOOLING,PERIP MOLDS,CURE,MANIFOLD	00001	NT02497			3/6/2002
AA	000026		WELDING STAND	00001	NT02498			3/6/2002
AA	000028		FIXTURE,BEAM TUBE SWAGEING QUAD	00001	NT02602			3/6/2002
AA	000021		SCALE, ELECTRONIC	00001	NT02603			3/6/2002
AA	000027		PARTS,WELDER, Y&S PRESS,CABLE SUP	00001	NT02604		Y&S PRESS	3/6/2002
AA	000031		TENSIONER, WIRE MI SEXT COIL	00001	NT02605		MI SEXT	3/6/2002
AA	000036		SPARE CABLE FOR ROBOTRON	00001	NT02832		S38/AURORA #90054MCD10024	3/26/2002
AA	000035		SPARE PARTS FOR ROBOTRON	00001	NT02834		S38/AURORA#90054 MCD10025	3/26/2002
AA	000037		OVEN, CURING	00001	NT02881			3/27/2002
ME	225868		FIX.,SPHERICAL(FOOT)PAD ALIGNMENT	00001	NT25901		B2-A	5/18/2001
ME	185668		FIXTURE, CURING 7 TURN	00001	NT27393		SQD	3/27/2002
ME	274020		DATA MITE	00001	PW8		QC Area/ Aurora	8/21/2002

Size	Part #	Rev.	Tooling Description	Qty	SMR #	FNAL #	Comments	Date
ME	274020	D	LAM CHECKING FIXTURE	00001	PW8		QC Area/ Aurora	8/21/2002
aa	000271		fmi inducbrazingcoil (robotron)		site 38			6/4/2002
ME	301078		FIX, LIFTING YOKE LAMINATION	00001	TPL		SMR# 90009	3/8/2000
AA	000278		MURDOCK CURING PRESS PARTS	00004	TPL		LHC (END CLAMP & SUPP)	3/1/2000
ME	301078	A	FIX. , YOKE LIFTING	00001	TPL			3/8/2000
AA	000325		FIXTURE, LIFTING GENERIC	00001	TPL			3/1/2000
ME	318066		FIX, LIFTING MIR DIPOLE	00002	TPL		I139, TLF 1107, 1108	5/21/2001
ME	198699		FIX, LIFTING B2	00001	TPL		B2, TLF 1052	5/21/2001

Fermilab

Fermi National Accelerator Laboratory
Technical Division / Headquarters
P.O. Box 500
Batavia, IL 60510
Phone: (630) 840-3340 Fax: (630) 840-3756

Thursday, March 16, 2001

To: Stephen Holmes
George Robertson

From: Peter Limon

Subject: The Rehabilitation, Re-use, and Refitting of Existing Facilities — PW8

Re: Directorate Memo, R&R Program Under The Waste Management Funds, Dated December 15, 2000

A comprehensive proposal has been put together and is attached for the rehabilitation, re-use and refitting of PW8. The main purposes of this project are: a) to cleanup the lead contamination from PW8, and b) to replace an off-site storage facility with a convenient and less costly onsite facility. The R&R program provides us with an opportunity not only to address the lead decontamination and removal of obsolete experimental apparatus, but also to facilitate key infrastructure improvements (refitting) that will make the building useful to the Laboratory for many years and save considerable money.

The building was designed as an experimental hall, and as such does not have facilities that make for the convenient, economical and safe frequent access required of a storage facility. The refitting plan is intended to remedy that by installing a permanent jib crane to load and unload trucks, a mechanism to safely open and close the large and heavy drop hatch doors, and a trolley to move equipment from the drop hatch to a position under the building crane. As you will see in the attached proposal, considerable thought has gone into making this a plan that uses existing Laboratory equipment in a way that will minimize cost while at the same time resulting in a convenient and safe storage facility.

The PW8 facility is not very large compared to the Aurora warehouse. However, with the proper infrastructure and some additional space at the Site 38 Warehouses we will be able to relinquish the Aurora Warehouse. The total project cost of decontamination, removal of the experiment, infrastructure improvements and moving equipment from the Aurora Warehouse into PW8 is estimated to be $305 K, which breaks down as $190 K for decontamination and removal of the experiment, and $115 K for the infrastructure improvements and the move from the existing warehouse. For comparison, the Laboratory pays about $100 K per year in rent for the Aurora Warehouse, not including the (increasing) cost of utilities, so the payback period is less than three years.

Unfortunately, the Technical Division simply does not have the financial resources to pay for the infrastructure improvements. Without these improvements PW8 remains impractical for our use. The additional investment of $115K is very small considering the short payback period. The lease at the Aurora Warehous is due for renewal before June 2002, so there is no need to make the infrastructure improvements immediately. A reasonable approach would be to clean up the building in FY2001, and refit the building and move in in FY2002. We would prefer, of

course, to refit the building as soon as possible. The sooner we vacate the Aurora Warehouse the better. If we are not there next winter, for example, we can save the considerable fuel bill needed to heat the building. In addition, the organization responsible for cleaning the building might find it convenient to have the improvements to the building in place for some or all of the cleanup process.

Enclosures:
I. Proposal to Rehabilitate & Re-use PW8
II. Planned Infrastructure (Refitting) Improvements Package

cc: D. Carlson w/enc. I
B. Chrisman w/enc. I
J. Cooper w/enc. I & II
W. Griffing w/enc. I
K. Stanfield w/enc. I

Cc:

Attachments.

Rehabilitation & Re-use of Existing Facilities

Proposal To Rehab PW8 As TD Storage For Tooling & Heavy Equipment

March 16, 2001

BACKGROUND

The Central Goals

- Cleanup lead contamination from PW8.
- Find an alternative to offsite storage.

Brief History Of The Search For Onsite Storage

The Technical Division, with the help of the Directorate, has been searching for suitable storage facilities onsite for more than six years. During this period, several fixed target experimental areas were studied for potential onsite storage. These areas lacked key infrastructure, such as access and overhead cranes, or they required costly cleanup and rehabilitation. We did use MW9 and NWA, after investing substantial efforts in cleanup and moving, for about two years each, but ultimately the Lab decided that there were more important uses for those buildings, and we were evicted. The Tagged Photon Laboratory, PW8, and PC4 were other potential storage locations that required costly cleanup and infrastructure improvements. We occupied TPL in 1999 when we were required to move out of NWA, and to mitigate safety concerns due to overcrowding in the Magnet Storage Building. The rehabilitation and refitting of either PW8 or PC4, the other identified appropriate sites, remained cost prohibitive due to the extensive cleanup and refitting that would be required. This situation has been changed by the availability of Waste Management Funds for Rehabilitation and Re-use.

Introduction

Soon after the Waste Management Funds became available for Rehabilitation and Re-use last December, the Technical Division initiated a dialogue with the Particle Physics Division to rehabilitate PW8. We determined that the facility could be used for storing magnet tooling and other equipment that is currently stored at the Aurora Warehouse and Site 38 Warehouses I and II. We notified the Directorate and the ES&H Section of the possible use of PW8, and of our ongoing discussion with PPD and we held a feasibility study meeting on February 02, 2001 with BSS management. Since PW8 is considerably smaller than the Aurora Warehouse, we asked BSS to provide additional space at Site 38 Warehouses I and II for storing materials used by LHC, NUMI, and TD that are presently stored at the Aurora Warehouse. The ultimate goal is to vacate the Aurora Warehouse at the end of its current lease (June 2002), thus saving the laboratory approximately $100K/year. The Technical Division then identified the major issues, listed below, and formed a plan to refit PW8 to make it suitable as a storage facility.

Relevant Issues

1. Identify space used at the Aurora Warehouse by affiliation (CMS, LHC, NUMI, TD)
2. Determine the total space needed by LHC, NUMI, & TD to move out of the Aurora Warehouse.
3. Find space for CMS storage and panel washing operations. PPD has taken the responsibility of finding space for CMS onsite.
4. Determine the total space available in PW8. There is not enough space for all TD equipment presently at Aurora. BSS has agreed to store some items at Site 38.
5. Determine the resources needed for cleanup and decontamination of PW8. This is a PPD responsibility, and has been estimated.
6. Determine what infrastructure improvements are necessary to make PW8 a safe, efficient and cost effective storage facility. Because we expect to need relatively frequent access, usually for short periods of time, the goal is to use Fermilab personnel, not commercial riggers, to move equipment and material in and out of PW8. We have determined that the minimum infrastructure improvements are:
    a. Install a jib crane on top of the PW8 hatch
    b. Mechanize the 7,500 lb. hatch cover
    c. Install about 100 feet of rail track to connect hatch to building crane coverage
    d. Acquire a mechanized railroad cart to move materials in and out of PW8
7. Estimate what resources are needed for moving from the Aurora Warehouse, the cost of moving, and the time period required to complete the move

Aurora Warehouse Current Utilization Of Space

Description	**Sq. Ft.**	**% Of Total**
General Purpose Aisles	4750	22%
Pallets & Racks Storage With Access	4000	19%
Tooling	3800	18%
CMS Crates & Materials	3200	15%
CMS - Chamber Panels Washing Operation	2000	9%
Parts & Materials	1700	8%
Staging & Loading	1000	5%
Copper	750	4%
Total	**21200**	100%

- **Space available in PW8 under the 20 ton crane** **7,200 Ft^2**
- **PPD has requested to keep some space PW8** **750 Ft^2**
- **Space available for TD equipment in PW8** **6,400 Ft^2**

- **Total space needed for magnet tooling and heavy equipment** **8,400 Ft^2**
- **Shortfall in space available in PW8 for TD equipment** **2,000 Ft^2**

In order to vacate the Aurora Warehouse, this space will have to be found elsewhere in the Lab. We believe that such space is available at Site 38.

The Proposal

1. The PW8 rehabilitation & refitting will be supported under the R&R program outlined in the December 15, 2000 memo with ES&H Waste Management Funds.

2. The Particle Physics Division, current landlord of PW8, will be responsible for the complete cleanup of PW8. This will include removing cable trays and the decontamination of lead and other contaminants.

3. The Technical Division will consolidate magnet tooling and heavy equipment from the Aurora Warehouse, Site 38, the Magnet Storage Building, and IB3 in PW8.

4. The Business Services Section will provide space at Site 38 in Warehouses I & II to accommodate any remaining needs for space that result from the move out of the Aurora Warehouse.

5. The Technical Division, in conjunction with the Business Services Section will facilitate the actual move from the Aurora Warehouse to Site 38, PW8 and other onsite storage locations.

The Infrastructure Improvements include:

1. Install a 15-ton jib crane above the hatch access point with a monorail structure to move materials in and out of PW8. (We will use an existing crane hoist taken from A0, which will save about $25K)
2. Mechanize the PW8 bulky hatch cover (7,500 lb., 33' x 14') to provide safe, convenient, and cost effective operation.
3. Install a 30 in. gauge, 100 ft. rail track from the hatch drop area, down the corridor to PW8 and under the crane.
4. Fit an existing railroad cart with a bedplate from the Target Service Building. (A savings of ~$60K)
5. Mechanize the RR cart to haul materials in and out of PW8 safely, efficiently, and cost effectively.

The Estimated Cost for the PW8 R&R Project and the Aurora Warehouse move is as Follows:

• PW8 Experiment Cleanup (PPD)	$150 K
• PW8 Lead decontamination (PPD)	40 K
Total cleanup cost	**$190 K**

• Jib Crane Monorail Support Structure at the PW8 Hatch (FESS/TD)	$28K
• RR Track from the PW8 hatch to the Hall (FESS/TD)	$6K
• RR Cart Drive Mechanism/Motor	$8K
• PW8 7,500 lbs. 14 ft. X 33 ft. Hatch Cover Motorized (TD)	$23K
• EDIA and Contingencies (FESS/TD)	$20K
Total Infrastructure improvement cost	**$85K**

Cost of Moving from Aurora Warehouse ~1000 hours @ $30/hour	**$30K**
Total Project Cost	**$305K**

The Payback Period for the entire project is **THREE YEARS**

Summary
This project is based on the R&R criteria outlined in the Directorate memo of December 15, 2000, and meets all requirements under priorities 1 and 3, as enumerated in that memo. It also has the merit of providing long-term financial savings to the Laboratory if the building infrastructure is improved. For an additional $100,000 investment, the Lab will realize a $300,000 cost saving in three years, and complete payback for the total project. If the building is not improved, it cannot be used safely as a storage facility and the Lab will not recognize any cost savings. It seems obvious that the additional investment in infrastructure improvements is a good investment.

It is not imperative that we move out of the Aurora warehouse before June 2002, but the sooner we vacate the Aurora Warehouse the more money can be saved by the Lab. If we can be out before next winter, we will save considerably on the natural gas bill to heat the facility. However, if funds are not available in FY2001 to rehabilitate PW8, the cost of the project can spread over FY 2001 and FY2002. The Laboratory is expecting additional R&R Waste Management Funds from DOE in FY 2002 and beyond.

Sood 1/03/01

Fermilab

Technical Division Headquarters

December 15, 2000

DEC 19 2000

To: Division/Section Heads

From: George Robertson George P Robertson

SUBJ: ES&H MANAGEMENT PLAN BUDGET

Beginning this (FY2001) fiscal year, we have included rehabilitation of spaces into our ES&H Management Plan budget. That means we now have a source of funds (waste management funds) separate from operating money to provide for the rehabilitation and re-use (R&R) of laboratory facilities. Approximately $470,000 has been allocated for this fund in FY2001.

This memo is to announce the availability of this money and to outline a coherent process for selecting projects for R&R that optimize the use of this source of revenue. It is also intended as a call for proposals. In order to ensure that there is adequate time to efficiently utilize these funds, proposals should be submitted as soon as possible, preferably prior to the end of the second fiscal quarter (March, 31, 2001).

The basis for awarding funds for R&R will be to prioritize proposed projects on the following criteria:

1. Highest priority will be given to projects for which instituting a clean up would remove a significant ES&H concern. An example might be an abandoned space in which left over electrical or other utilities represent a hazard to anyone who might have cause to enter the space. Another (environmental) example might be a tank or other containment in danger of leaking a hazardous chemical to the environment.

2. Second priority will be given to projects designed to make available a space that is necessary for the physics program. For example, an unoccupied experimental hall in a beamline that presents no ES&H concerns but that would be used in a future experiment or other program purpose after rehabilitation and refitting.

3. Third priority would be given to proposals for which a desirable change of support function could be realized through some rehabilitation, even though the new use might not necessarily be critical to the physics program or under the control of the current division/section.

Proposals should be directed to the ES&H Section for initial screening. I will then review them in my capacity as the Laboratory's Capital Assets Manager. In addition to evaluating the proposal versus the above criteria, I will assess the importance of each proposal in the overall plan for the Laboratory's real property and make a recommendation on prioritization to the Director.

Proposals should include the following elements:

- An analysis of funding requirements and return on investment (ROI), including budgetary implications beyond funding and/or the first fiscal year,
- An evaluation of the practicability of funding the proposed project over a period of from one to three years,
- An assessment of definable and isolable elements of the project that may carry higher priorities than the project as a whole (e.g., a change in facility use unrelated to program needs – priority 3 – but which includes clean-up of lead contamination – priority 1).

If you have questions regarding proposals for these funds, please do not hesitate to contact Rod Walton for information at extension 2565.

cc: Building Managers
B. Chrisman
S. Holmes
M. Shaevitz
K. Stanfield
M. Witherell

Subject: **[Fwd: Aurora Warehouse]**
Date: Thu, 25 Jan 2001 10:44:17 -0600
From: sood <sood@fnal.gov>
Organization: Fermilab
To: Carlson Dave <carlson@fnal.gov>
CC: Kobliska Gregg <gregg@fnal.gov>, Limon Peter <pjlimon@fnal.gov>, Sood Romesh <sood@fnal.gov>

Dear David,

We are working very hard to find an alternative to Aurora Warehouse storage. As you know the pressure is on from DOE and the Directorate not to extend the rental lease if at all possible.

In support of the Directorate wishes we have been searching for a suitable storage place on site without incurring a major M&S expense. The recently announced Rehabilitation & Re-use program by George Robertson in his memo of December 15, 2000, has given us hope to rehab HIL with special waste management funds in fiscal year 2001, thus giving us a strong possibility to vacate the Aurora Warehouse within a year but not beyond the June 2002 lease expiration date.

This cannot be possible without the help and active participation by the Business Services Section. We have ~ 21,000 Sq. ft. leased space in Aurora Warehouse for TD, CMS, LHC, and NUMI. In addition we are also occupying area in the Site 38 Warehouse 1 and 2 for large and small items. Once emptied and cleaned, the HIL will give us ~8,000 sq. ft. of highly desirable space with a 20 ton crane to store large pieces of magnet tooling and equipment much more efficiently.

The PPD is currently looking for ground level space in the experimental areas to house the CMS chamber panels washing operation and their storage. This combined with the HIL space will still leave the Technical Division with a net deficit of space which we are hoping will be made available at Site 38 warehouse 1 and 2.

Over the next 2-5 years the CMS, LHC, and NUMI needs for space will substantially taper off, thus relieving pressure on storage requirements.

As per our discussion this morning, a meeting with you, your key staff, TD - MCD, and I is needed to bring everyone up to speed to make this transition, i.e., a move from Aurora Warehouse to on site storage a reality.

Thank you for your Support, guidance, and enthusiasm you have shown in this matter.

Sincerely,
Romesh

Subject: **Aurora Warehouse**
Date: Wed, 24 Jan 2001 15:07:19 -0600
From: Gregg Kobliska <gregg@fnal.gov>
Organization: Fermilab
To: "Romesh C. Sood" <sood@fnal.gov>, David A Carlson <carlson@fnal.gov>
CC: Rodriguez Bonnie <brodrigu@fnal.gov>, Ronald R Haynes <rhaynes@fnal.gov>, Zweibohmer John <johnz@fnal.gov>

Dear Romesh and Dave,

I think it would be good for us to have a meeting to discuss the scope of our plans to move from Aurora. During a warehouse walk through justification exercise a few months ago, we were told that BSS had over 700 empty spaces in the racks. There are some rumors this space is not going to be available. We need to know that space is still available, and that BSS is not going to hold it for another division. There are rumors that written justifications will be required of us for everything we want to send to Site 38. We need to know what, if any, requirements will be made of us in the way of justifications.

I am concerned that we could be making promises and/or representations to the directorate that we may not be able to keep. This meeting will also give us chance to present the overall plan to BSS mgmt since they will be heavily involved. One could argue that it is premature since a deal has not been struck with PPD yet, but there is no sense in striking a deal unless there is some agreement with the BSS.
--

Gregg Kobliska
TD/MC, Mail Stop 316
Fermilab
P.O. Box 500
Batavia, IL 60510

phone: 630-840-4893
fax: 630-840-8022

Subject: Meeting Notice
Date: Thu, 25 Jan 2001 14:40:49 -0600
From: areidl <killer@fnal.gov>
To: Dave Carlson <carlson@fnal.gov>, Ron Haynes <rhaynes@fnal.gov>, Frank Cesarano <cesarano@fnal.gov>, Dale Wilderspin <dwilders@fnal.gov>, Jack Kelly <jkelly@fnal.gov>, Gregory Kobliska <gregg@fnal.gov>, Romesh Sood <sood@fnal.gov>
CC: Margie Bruce <mbruce@fnal.gov>, Cindy Anderson <canders@fnal.gov>, Ann Arnold <aarnold@fnal.gov>

Subject: Warehouse Move Planning

Date: Friday, February 2, 2001

Time: 10:00 - 11:00 a.m.

Location: Site 38, Warehouse II Annex

Attendees: Dave Carlson, Ron Haynes, Frank Cesarano, Dale Wilderspin, Jack Kelly, Romesh Sood, Greg Kobliska
~~~~~~~~~~~~

Ann M. Reidl
BSS/Section Office
Mail Station 211
Phone: (630) 840-2628
Fax: (630) 840-4809
~~~~~~~~~~~~

Aurora Warehouse Move
Feasibility Studies
February 02, 2001

Participants:

Business Services Section -	David Carlson ✓
	Frank Cesarano ✓
	Ron Haynes ✓
	Jack Kelly ✓
	Dale Wilderspin ✓
	Rudy Dorner ✓
Technical Division -	Gregg Kobliska ✓
	Art Paulsen ✓
	Bonnie Rodriguez ✓
	Romesh Sood ✓
	~~John Zweibohmer~~

Discussion Items:

- **Background**
- **Aurora Warehouse Current Storage Space**
- **CMS Panel Washing Operation**
- **PW8 HIL Total Space**
- **Site 38 Warehouse I & II Current Level Of TD-Storage**
- **Warehouse I & II Additional Space Available/Needed**
- **Aurora Warehouse Move Coordination – "A Collective Effort" Help From BSS**

Aurora Warehouse Current Utilization Of Space -

Description	Sq. Ft.	% of Total
General Purpose Aisles	4750	22%
Pallets & Racks Storage With Access	4000	19%
Tooling	3800	18%
CMS Crates & Materials	3200	15%
CMS - Chamber Panels Washing Operation	2000	9%
Parts & Materials	1700	8%
Staging & Loading	1000	5%
Copper	750	4%
Total	**21200**	100%
Site 38 Warehouse I and II		
Tooling		
Large Equipment		
Other Storage		
Additional Space Available		
PW8 High Intensity Laboratory Experimental Hall		
Total Space 237 ft. X ~32 ft.	**7584**	36%
Difference		

Subject: [Fwd: CMS storage]
Date: Mon, 29 Jan 2001 09:43:20 -0600
From: sood <sood@fnal.gov>
Organization: Fermilab
To: Kobliska Gregg <gregg@fnal.gov>
CC: Sood Romesh <sood@fnal.gov>

Gregg,
FYI,
This explains what the Site 38 people were saying, Bonnie heard it right. We will find the details and the real situation this Friday when we will meet with Dave Carlson.

Romesh

Subject: Re: CMS storage
Date: Fri, 26 Jan 2001 18:00:27 -0600
From: John Cooper <jcooper@fnal.gov>
To: apollina@fnal.gov
CC: "Cooper, John" <jcooper@fnal.gov>, Mike Shaevitz <shaevitz@fnal.gov>, Apollinari Giorgio <apollina@fnal.gov>, Sood Romesh <sood@fnal.gov>, "Pordes, Stephen" <stephen@fnal.gov>

Giorgio, Romesh, Stephen,

My confusion was removed when George Robertson said that his scheme was to move the CMS stuff into the regular onsite warehouse -- so now PPD does not have to find a home for CMS. We ARE using the onsite space as per George's original memo to me, just not for the TD tooling.

Time scale for offsite to onsite move is undefined, may depend on the time required to clean up PW8.

Stephen and Romesh should talk about PW8 and sharing of that space (when cleaned) between PPD and TD.

John

----- Original Message -----
From: Giorgio Apollinari <apollina@fnal.gov>
To: John Cooper <jcooper@fnal.gov>
Cc: Pordes, Stephen <stephen@fnal.gov>; Sood Romesh <sood@fnal.gov>; Apollinari Giorgio <apollina@fnal.gov>
Sent: Wednesday, January 10, 2001 10:16 AM
Subject: Re: CMS storage

> Hi John
> you are right, you have all my inputs.
> My only concern was a recent phone call I received from Romesh who is trying to
> solve the Aurora Wharehouse issue and it became unclear to me for a moment who
> was going to think and follow-up on the CMS-EMU storage needs.
>
> I'm perfectly happy with you following this trail, and Romesh agrees.

> Please do not hesitate to contact me for any question you may have: the common
> goal of saving the Lab 100k$/year in the wharehouse renting is a great
> motivation to have this done earlier rather than later.
>
> Giorgio
>
> John Cooper wrote:
>
> > Giorgio,
> > I'm still following this trail -- see way way down below where I am
> > being asked by Robertson to do this. That's why we asked Dan who asked you
> > who .....
> >
> > You suggested in your voice mail that we meet -- I don't know that a
> > meeting is really needed since we did get your input, but you might talk to
> > Stephen about all this?
> >
> > John
> >
> > ----- Original Message -----
> > From: Giorgio Apollinari <apollina@fnal.gov>
> > To: Dan Green <dgreen@fnal.gov>
> > Cc: John Cooper <jcooper@fnal.gov>; Apollinari Giorgio <apollina@fnal.gov>
> > Sent: Tuesday, December 05, 2000 4:21 PM
> > Subject: Re: CMS storage
> >
> > > Hi there
> > > in the Aurora Wharehouse (~20 K square feet) we are presently occupying
> > > ~10 K
> > > square feet and we are storing the following items:
> > >
> > > 1) All the un-machined (ready to go to Lab 8) and machined (out of Lab 8,
> > > ready
> > > to go to MP9 or China/Russia) panels. These are occupying ~3/4 of the
> > > space and
> > > will slowly wind-down to 0 by end of FY03. These panel boxes require
> > > almost
> > > weekly access (as they leave, come back and leave again).
> > >
> > > 2) All the "production chambers" produced so far. By February '01 we
> > > should
> > > start shipping them to the US FAST sites, but I suspect that FNAL will
> > > still
> > > have to provide a buffer for completed chambers if the FAST site cannot
> > > accept
> > > them. 5 or 6 prototypes of different-sized chambers are also stored in
> > > Aurora.
> > > These prototypes will always stay at FNAL and be used for integration
> > > tasks (we
> > > will move them , one by one, to Lab 7 where we will complete the
> > > integration
> > > work).
> > >
> > > 3) A cleaning machine and drying racks are stored in Aurora. We operate

> > these
> > > tool ~1 day/week to clean our panels before assembly at MP9. We will have
> > to do
> > > the same with China and Russia panels. The cleaning machine is removing
> > all the
> > > burrs and machine marks left on the panels. I want to keep the cleaning
> > > operation outside the assembly factory due to the humidity and copper
> > > particulates generated by the abrasive brushes.
> > >
> > > 4) Not yet stored in Aurora, but soon to come, are the Frames and
> > Mechanical
> > > Integration parts.
> > >
> > > As long as climate control is concerned, we don't need more than what is
> > > available over there: just heating and bathrooms (to avoid noxious fumes).
> > >
> > > Giorgio
> > >
> > > Dan Green wrote:
> > >
> > > > Hi John,
> > > > The HCAL optics effort is winding down. I imagine that the largest
> > volume
> > > > is CSC parts for EMU, which is why I'm ccing Giorgio.
> > > > Cheers,
> > > > Dan
> > > >
> > > > -----Original Message-----
> > > > From: John Cooper [mailto:jcooper@fnal.gov]
> > > > Sent: Monday, December 04, 2000 10:40 AM
> > > > To: Dan Green
> > > > Cc: Cooper, John
> > > > Subject: CMS storage
> > > >
> > > > Dan,
> > > > How much CMS stuff is or is expected to be stored in the Aurora
> > > > Warehouse? I'm being asked by Robertson if I can store it on site
> > somewhere
> > > > but I don't know how much storage, how frequent the access, what kind of
> > > > stuff we are talking about, what kind of climate control, ... Your
> > > > probably told me once long ago, but ....
> > > >
> > > > Can you help out on the specs?
> > > >
> > > > Thanks,
> > > > John
> > > >
> > > > --
> > > > Giorgio Apollinari
> > > > TD/ENG, Mail Stop 314
> > > > Fermilab phone: 630-840-4641
> > > > P.O. Box 500 fax: 630-840-8079
> > > > Batavia, IL 60510
> > > >
> > > >
> > > >

High Intensity Laboratory Experimental Hall
As Magnets Tooling Storage Area

February 12, 2001

Total sq. ft. of space in HIL Hall (237 ft. X ~31 ft.) = 7448 sq. ft.
This amount to 35 % of the total space available at Aurora Warehouse.

Total space needed for Tooling and Heavy Equipment Storage = 8370 sq. ft.

• Tooling from the Aurora warehouse	3800 sq. ft.
• Tooling from Site 38 Warehouse I and II	2420 sq. ft.
• Tooling from Magnet Storage Building	210 sq. ft
• Tooling (magnet press) from IB3	440 sq. ft.
• Space for aisles	1500 sq. ft.
Net difference of -	**-922 sq. ft.**

The Issues On Hand –

1. **Technical Division needs for additional on site storage to move out of the Aurora Warehouse.**
2. **CMS storage needs for chamber panels and ready chambers.**
3. **CMS needs for space for the chamber panels washing operation.**
4. **Particle Physics needs for on site storage space.**
5. **Additional space that is and may be available at Site 38 Warehouse I and II**
6. **HIL Hatch Jib Crane, Mono Rail, Inside HIL Rails and Transporter**

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Aurora Warehouse Current Utilization Of Space -

Description	Sq. Ft.	% of Total
General Purpose Aisles	4750	22%
Pallets & Racks Storage With Access	4000	19%
Tooling	3800	18%
CMS Crates & Materials	3200	15%
CMS - Chamber Panels Washing Operation	2000	9%
Parts & Materials	1700	8%
Staging & Loading	1000	5%
Copper	750	4%
Total	**21200**	100%
Site 38 Warehouse I and II		
Tooling		
Large Equipment		
Other Storage		
Additional Space Available		
PW8 High Intensity Laboratory Experimental Hall		
Total Space 237 ft. X ~31 ft.	**7447.5**	35%
Difference		

Received a copy from George R. on 2/14/01 upon Request. RCS

Fermilab
ES&H Section

February 2, 1999

TO: John Cooper

FROM: Bill Griffing

SUBJECT: Rehabilitation and Re-use (R&R) Funds

The Associate Directors recently met to discuss the proposals submitted by Divisions and Sections for use of FY2001 R&R funds. Two of your proposals were recommended to, and approved, by the Director. These were PC4 and PW8.

You may proceed as soon as you are ready with the work that was proposed at both of these locations. In order to track the costs for completion of this work, I would like for you to charge all costs associated with the R&R of these areas as follows:

Area	Budget Code	Amount Obligated
PC4	HXR	$240K
PW8	HXS	$200K

I would appreciate it if you would let me know who your task manager will be that will coordinate each, or both, of these activities. Remember that these activities are no different than any other activities meaning that the jobs must be planned, hazard analyses performed, and resources scheduled to effectively and efficiently accomplish the work. I assume that your in-house ES&H and engineering resources will be available to you to accomplish these tasks. Let me know if you require any expertise from outside of your organization.

I recognize that it may be necessary for you to use some of the same resources for both of these projects. I would appreciate it if you would have them do effort-reporting to keep the costs associated with each project separate. By doing so, we hope to be able to better predict the cost of future R&R work. You mentioned that you might have funds from other sources that could be used to finish these jobs should they prove to be insufficient. That's good because I think the Directorate is very anxious for the R&R of these spaces to be fully accomplished. If other fund sources are used, however, please see if you can track these costs separately as well so that we know the total amount actually spent on each of these R&R projects.

There are expectations with both of these projects that we will be able to clear them from being "areas containing radioactive materials" so that the enclosures could be used to store items without jeopardizing the possibility of recycling them in the future due to the present moratorium, now regarded as possibly being of indeterminate length. With your permission, I would like to ask Don Cossairt of my Section to convene a meeting between the RSO's of your Division and the Beams Division to work out a plan for what needs to be done in both PC4 and PW8 to clear them from the list of "areas containing radioactive materials."

If there are any questions, please call me at X8069.

Cc: G. Robertson
D. Cossairt
D. Grobe
E. Arroyo
M. Koch
T. J. Sarlina

Rehabilitation & Re-use of Existing Facilities

Proposal To Rehab PW8 As TD Storage For Tooling & Heavy Equipment

March 07, 2001

BACKGROUND

The Central Issue

Eliminate Offsite Storage (DOE)

Fermilab Core Objective

Find onsite storage facilities to discontinue the Aurora Warehouse lease, thus complying with the DOE wishes and saving the Laboratory $100K/year in operating funds.

Continuos Search For Suitable Storage Onsite

TD, with the help of the Directorate, has been continuously searching for suitable storage facilities onsite for the last six plus years.

Areas considered for onsite storage -

Meson MW9, Neutrino NWA, Proton TPL, PC4, PW8, and BSS Site 38 Warehouse I & II

MW9 from 1996 -1998

NWA from 1998-1999

Rehabilitation of TPL in 1999 to move out of NWA and reduce overcrowding in the Magnet Storage Building.

High Cost Of Rehabilitation and Re-use

PC4 and/or PW8 R&R was cost inhibitive.

Availability Of Waste Management Funds Rehabilitation & Re-use

Directorate invited D/S proposals for R&R to be submitted to the ES&H Section by 3/31/2001

Introduction –
Soon after the Waste Management Funds became available, the Technical Division initiated a dialogue with Particle Physic Division to rehab PW8 to be used for magnet tooling and heavy equipment that is currently stored at Aurora Warehouse and Site 38 Warehouse I and II. We immediately notified the Directorate and ES&H Section of the possibility of acquiring PW8, and our ongoing discussion with PPD.

We also held a feasibility study meeting on February 02, 2001 with BSS management, asking them to provide additional space at Site 38 Warehouse I & II, for LHC, NUMI, and TD materials stored at Aurora Warehouse, in support of discontinuing the use of Aurora Warehouse beyond its current lease terms, thus saving the laboratory approximately $100K/year.

We received a favorable response from PPD, the Directorate, ES&H, and BSS to this proposal under the R&R program based on its merits and yearly savings which will lead to a very short payback period.

The Technical Division went to work immediately to identify all relevant issues not only to PW8 storage infrastructure improvements but also to find additional onsite space which would allow us to relinquish the Aurora Warehouse.

The Relevant Issues –

- The space used at the Aurora Warehouse by affiliation (CMS, LHC, NUMI, TD)
- The total space needed to move out of the Aurora Warehouse for LHC, NUMI, & TD
- The PPD is to arrange space for CMS storage and panel washing operation
- Space required for the TD tooling and heavy equipment in PW8
- Total space available in PW8
- Efficient and cost effective usage of storage areas
- Additional space needed at Site 38 Warehouse I and II
- PW8 complete cleanup and decontamination of lead & others contaminants
- Imperative infrastructure improvements necessary to make PW8 a **safe**, efficient and cost effective storage facility.
- Use of in-house technicians vs. high cost T&M Riggers to haul experiment apparatus out of PW8, and subsequent movement of magnet tooling and heavy equipment in and out of PW8 storage area.
- Resources for moving from the Aurora Warehouse, cost of moving and time period required to complete the move
- Safety of workers throughout the R&R operation and beyond.

Aurora Warehouse Current Utilization Of Space -

Description	Sq. Ft.	% of Total
General Purpose Aisles	4750	22%
Pallets & Racks Storage With Access	4000	19%
Tooling	3800	18%
CMS Crates & Materials	3200	15%
CMS - Chamber Panels Washing Operation	2000	9%
Parts & Materials	1700	8%
Staging & Loading	1000	5%
Copper	750	4%
Total	**21200**	100%

- **Space available in PW8 with 20 ton crane ~7,200 Sq. Ft.**
- **The PPD request to keep ~ 750 Sq. Ft. space in PW8**
- **Total space needed for magnet tooling and heavy equipment ~ 8400 Sq. Ft.**

The Proposal –

1. The PW8 rehabilitation & refitting will be supported under the R&R program outlined in the December 15, 2000 memo with the ES&H Waste Management Funds.

2. The Particle Physics Division will coordinate the infrastructure improvements to the specifications of the Technical Division. See infrastructure improvements work package enclosed.

3. The Particle Physics Division, current landlord of PW8, will be responsible for the complete cleanup of the PW8. This will also include removing cable trays, and the decontamination of lead and other contaminants.

4. Under this proposal, the Technical Division will consolidate most of the magnet tooling and heavy equipment from Aurora Warehouse, Site 38, MSB, and IB3 in PW8 to take advantage of the existing 20 ton crane and in combination with the proposed jib crane on top of the hatch to move heavy pieces in and out cost effectively.

5. The Business Services Section will provide adequate space at Site 38 in Warehouse I & II to accommodate the move from Aurora Warehouse.

6. The Technical Division in coordination with the Business Services Section will complete the move from the Aurora Warehouse to Site 38 and other onsite storage locations.

7. The Aurora Warehouse move is contingent upon the PW8 infrastructure improvements and availability of BSS and TD crew.

The Infrastructure Improvements include;

- Install a 15 ton jib crane above the hatch access point with a monorail structure to move materials in and out of PW8. *(We are using an existing crane hoist taken out from A0, a savings of ~ $25K)*
- Mechanize the PW8 (7,500 lb., 33' x 14') bulky hatch cover to provide a safe, convenient and cost effective operation.
- Install a 30" size 100' long rail track from the hatch drop area, down the corridor to PW8 under the crane.
- Provide an existing railroad cart with a bed plate from TSB. *(a savings of ~$60K)*
- Mechanize the RR cart to haul materials in and out of PW8 safely, efficiently, and cost effectively.

The Estimated Cost for the PW8 R&R Project and the Aurora warehouse move is as Follows:

• PW8 Experiment Cleanup (PPD)	$150K
• PW8 Lead Decontamination **"additional"** (PPD)	$40K
	$190K

• Jib Crane Monorail Support Structure at the PW8 Hatch (FESS/TD)	$28K
• RR Track from the PW8 hatch to the Hall (FESS/TD)	$6K
• RR Cart Drive Mechanism/Motor	$8K
• PW8 7,500 lbs. 14 ft. X 33 ft. Hatch Cover Motorized (TD)	$23K
• EDIA and Contingencies (FESS/TD)	$20K
	$85K

Cost of Moving from Aurora Warehouse ~1000 hours @ $30/hour	**$30K**
Total Project Cost	**$305K**

The Payback Period of approximately **THREE YEARS**

Summary -

This project is based on the R&R criteria outlined in the Directorate memo of December 15, 2000, and therefore meets all requirements under priority 1 and 2. It also has the merit of providing long term cost savings to the Laboratory. Rehabilitation and refitting (infrastructure improvements) are part of this program. It is our intention and goal to provide a safe and cost effective mechanism to carryout the challenging R&R and subsequent storage operation.

Without planning and funding the appropriate infrastructure improvements, the Technical Division will not be able to move out of the Aurora Warehouse and into PW8. The Technical Division does not have funds to carryout infrastructure improvements and/or moving cost. We are confident that the proposed infrastructure improvements will expedite the removal of existing experiment apparatus, thus providing cost savings to the R&R operation.

If for any reason PW8 R&R FY 2001 funds are insufficient to rehab both PC4 and PW8, the project can be supported and spread over FY 2001 and 2002. The Laboratory is expecting additional R&R Waste Management Funds from DOE in FY 2002 and beyond.

Fermilab

Fermi National Accelerator Laboratory
Technical Division / Headquarters
P.O. Box 500
Batavia, IL 60510
Phone: (630) 840-3340 Fax: (630) 840-3756

November 08, 2001

To: William Griffing, Head ES&H Section

From: Romesh Sood, Head TD Support Department

Subject: The Refitting and Re-use of Existing Facility - PW8

Re: Directorate Memo, R&R Program Under The Waste Management Funds, December 15, 2000

Here is the breakdown for the remaining work to be done to complete PW8 R&R and Refitting and restoration of the Aurora warehouse before it is returned to the owner coming June.

The runway structural framing 50' long 15' elevation for 20-ton crane provided by Fermilab.
COST.....$18,525
Mechanized electrical hatch cover requiring modifications to existing cover and the addition of electrical hoists, Controls, and fabricated sections.
COST.....$16,700
Installation and delivery of the above items.
COST.....$13,561
Removal of the PW8 attached gas shed.
COST.....$3,000
Infrastructure support for paving and setting of footings.
COST.....$1,850
Restoration of the Aurora warehouse before returning to the owner.
COST.....$5,000

Contingency of 10% for above items.....$5,864

Sub Total..... $64,500

The Technical Division oversight and labor to complete this work at PW8 and Aurora warehouse.
COST.....$40,000

Total Reuse and Refitting Cost.....$104,500

Copy:
G. Robertson
P. Limon
B. Chrisman

MAILED
11-12-01